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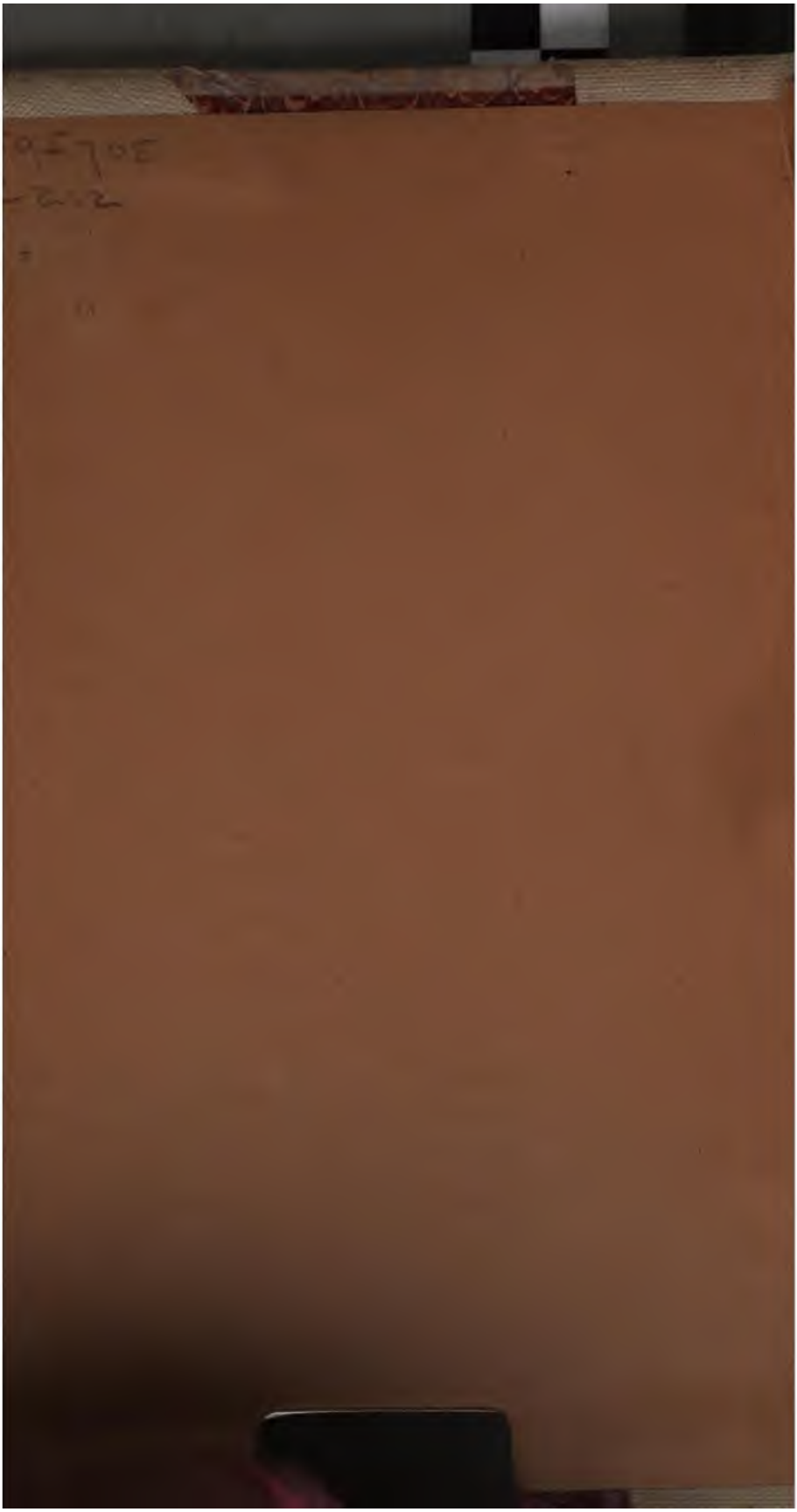

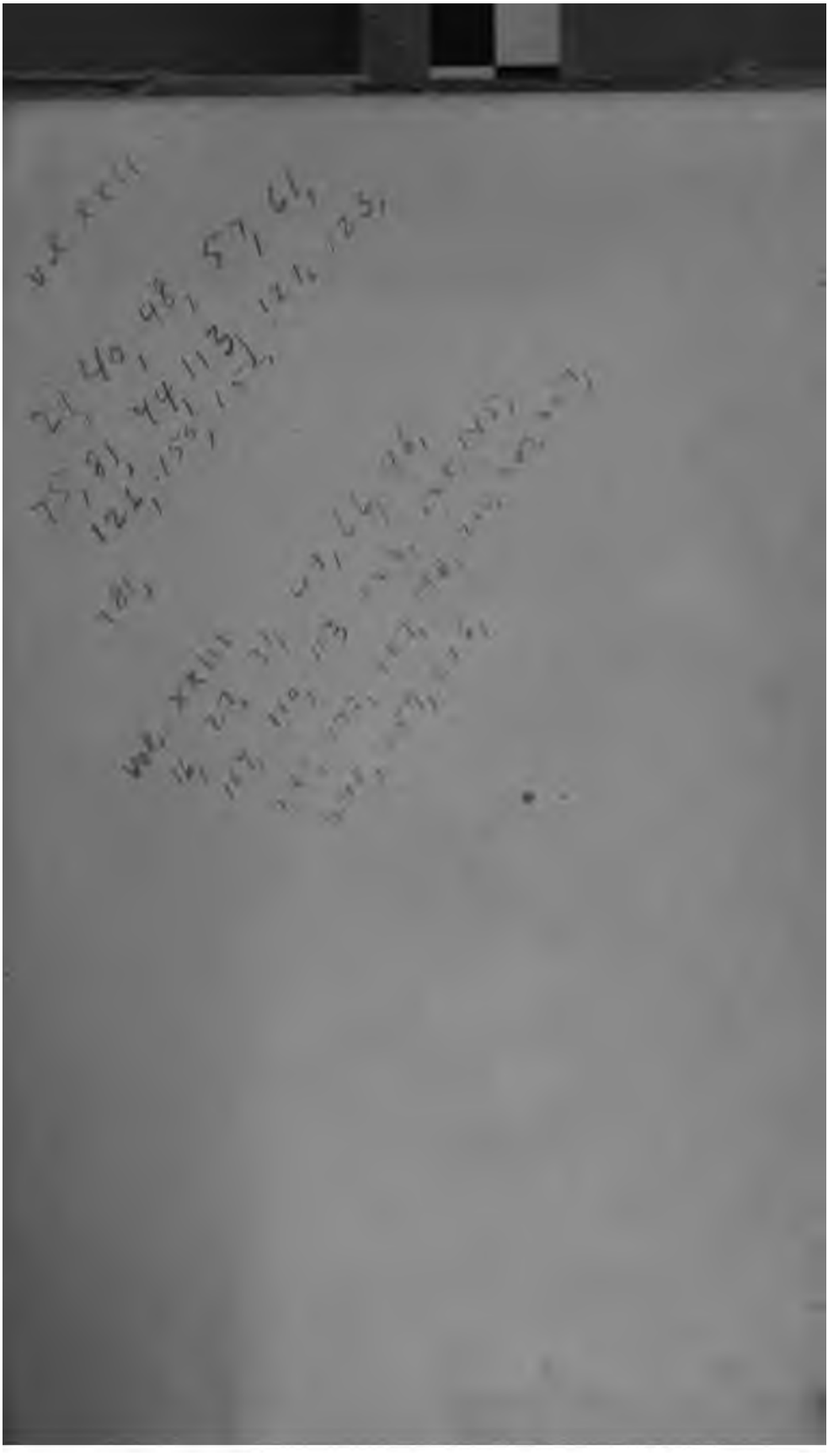

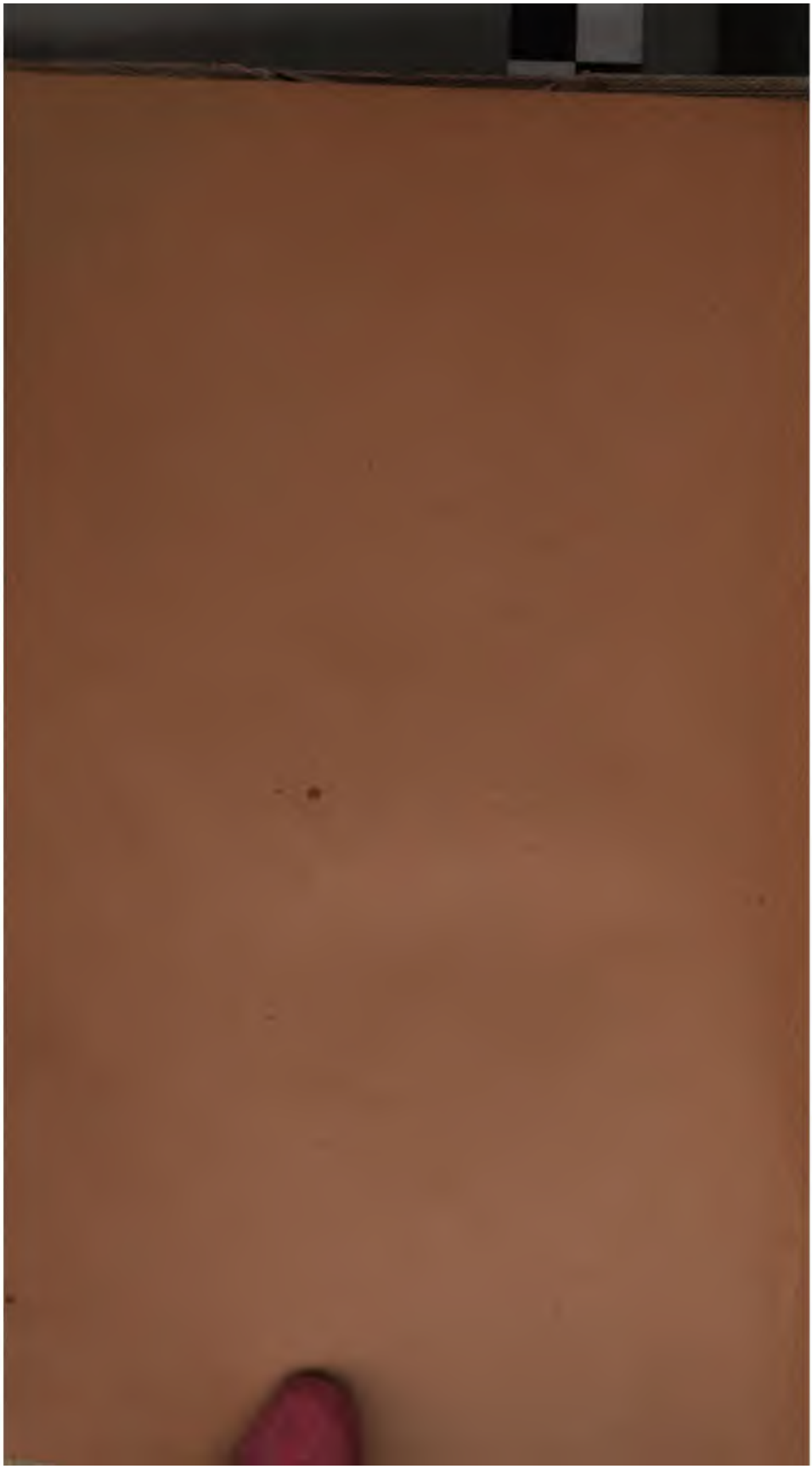

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THE CANADIAN ENTOMOLOGIST.

VOLUME XXII.

EDITED BY THE

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PORT HOPE, ONTARIO.

ASSISTED BY

J. Fletcher, Ottawa; J. M. Denton and W. E. Saunders, London.

London, Ont.:

LONDON PRINTING AND LITHOGRAPHING CO.

1890.

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The Canadian Entomologist.

VOL. XXII. LONDON, JANUARY, 1890. No. 1.

BALANINUS—ITS FOOD HABITS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

All the described species of *Balaninus* inhabiting America north of Mexico when larvæ live in the fruit (nuts and acorns) of the various species of *Quercus*, *Castanea*, *Corylus* and perhaps *Fagus* of the order *Cupuliferæ*, and *Carya* of the *Juglandaceæ*. Acorns, somewhat largely used in this country in the arts and in the manufacture of certain dietetics, are mostly imported, the native production being rendered almost worthless by these larvæ; and our chestnuts as soon as collected must be kiln-dried or otherwise treated, which renders them greatly inferior to those of foreign countries. *Balaninus* has not yet received any attention from an economic standpoint, but from the above would seem deserving of some consideration in that direction. The systematic separation of the species has only been effected recently and definite characters furnished for their recognition. Say probably had all the now described species before him, and excluding *proboscoideus*, included them in his *rectus* and *nasicus*. The failure of Say, one of the clearest of describers, to make his species recognizable by description, is suggestive of the absence of points of saliency, and has been the source of much confusion in our literature, some of which is evidenced in the earlier volumes of the CANADIAN ENTOMOLOGIST.

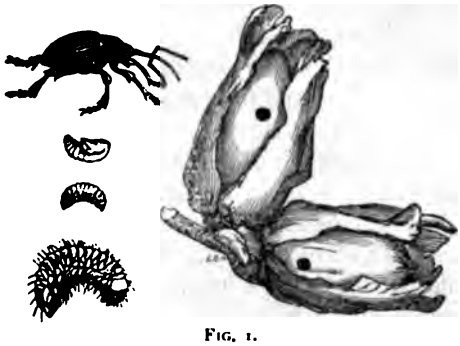


FIG. 1.

NOTE.—Figure 1, drawn by Miss Ormerod, represents a European species, *Balaninus nucum* Linn., which feeds upon filberts. It conveys a good idea of the characteristic forms of the genus.

The separation of *Balaninus* into species with valid characters was effected by Dr. Geo. H. Horn in a monograph of the genus in 1873 (Proc. Am. Phil. Soc., Phil., xiii., 457, et. seq.). The species assigned to Say's names were determined by the descriptions of Gyllenhal from types sent him by Say, and the assignment has not been questioned —*Requiat.*

To the old species, *caryatry*[illegible] and *uniformis* (Lec., 1857), were added *caryæ* and *qu*[illegible]5, Mr. F. Blanchard (Bul. Brook. Ent. Soc., vii., 107,)[illegible]. The systematic part of the work has been well d[illegible]rate separation of a mixed collection requires much c[illegible]le practice, and cannot be effected by mere inspection [illegible]hether each species has a preference for some particu[illegible] or nut, or whether there is an absence of choice, I ins[illegible]ments in rearing them, the results of which I propo[illegible] however, claiming them as finalities. In the year 18[illegible]elnuts *(Corylus Americana* and *C. rostrata)* collected here by myself; from chestnuts *(Castanea vesca)* purchased in the market, collected in many places in the surrounding country; and from acorns of white oak *(Quercus alba)*, chestnut oak *(Q. monticola)*, black oak *(Q. tinctoria)*, red oak *(Q. rubra)*, scarlet oak *(Q. coccinea)* and *Q. imbricaria*, all collected in the same woods, were placed in separate breeding jars, which were kept in my office till the present time, the winter temperature not falling below 40°, nor that of summer exceeding 65°. This was evidently an unnatural condition, and in part accounts for the irregular developement of the most of the species, and the not inconsiderable number of larvæ that go over till the next year.

B. proboscoideus Fab. *(caryatrypes* Bohm.).—This species was bred only from chestnuts. The first example appeared June 25 and the last July 12—a period corresponding with the blooming of the chestnut here. At the time of blossoming the chestnuts are fully formed, and larger than might be supposed. The envelope or burr is over three-fourths of an inch in height, soft, and covered with distant tubercles from which the prickles afterwards develope. The ♀ *proboscoideus* at this time deposits her eggs and dies, her life being limited to a week or two at the most—none being found after the bloom has fallen. About eighty examples were reared, the sexes being numerically equal. They were uniform in size and color, and beautifully variegated with fuscous lines and spots interspersed among the dense clothing of ochreous scales on the thorax and elytra. I have, how-

ever, seen in collections examples entirely ochreous. The ♀ beak varies in length from one and one-quarter to about twice that of the body. The character distinguishing it from all the other species is that the first joint of the funicle of the antenna is shorter than the second.

B. rectus Say.—This, like the preceding, was bred from chestnuts only. The first example appeared June 28, and others followed very sparingly, and till date (Oct. 1st) ninety-five examples have been taken. Pupæ in various stages and many larvæ are yet in the earth, and will no doubt go over till next year. The conditions in breeding are evidently unnatural, but why *proboscoideus* was not influenced equally (being in the same vessel) seems strange. In nature the beetles would certainly have been on hand for the chestnuts when in bloom, at which time they are taken by beating the blossoms. Though only raised by me from chestnuts, this species may breed here in acorns, as I took a ♀ May 15th with *nasicus* by beating. Dr. Levette, of Indiana, once sent me a set raised by him from Arizona acorns, the beetles appearing in December of the year in which the acorns grew, which in no way differ from those bred from chestnuts. The individuals vary greatly in size (4 to 7 mm) and in colour. The general colour of the scales and hair is light brown above, paler below; the thorax has a dark brown discal stripe, limited at the sides and divided longitudinally by a pale yellow line, the elytra being interspersed in various ways with markings of the same colour. I have never seen one entirely unicolorous. The beak of the ♀ is very long and slender, equalling or even exceeding that of the preceding species in proportion to the size; this and the form of the thorax, which is long and conical, will distinguish the ♀ from all others. The ♂ has a shorter thorax, but it is still narrowed anteriorly; this, with small femoral tooth, oval elytra rapidly narrowed from base, and a yellowish or brownish spot of condensed scales on each side of the central line of the metasternum (occasionally obsolete), will, with practice, distinguish it.

B. quercus Horn.—This species was bred from all the species of acorns mentioned except the annuals (white and chestnut oak). The first example appeared June 10th, and till August 1st about one hundred and sixty were observed; scattering ones have since occurred from time to time, and now the earth contains a few pupæ and larvæ, but not so many as in the case of *rectus*. This species seems to have no preference for any of the kinds of acorns mentioned, being reared from each in about

equal numbers. Whether development was retarded or deranged by indoor raising is uncertain, as I never took even a single specimen by beating, though evidently excessively abundant. The individuals vary from 5 to 9.5 mm. in length. The general color of all bred was ochreous brown, nearly uniform on th ously interspersed on the elytra with small yellowish ens from New Jersey and Florida are entirely cinereous tra with darker spots, and look as if belonging to a diffe ♂ of this species is distinguished from that of all very unique and striking character, viz., the pygidium ith the cavity smooth and surrounded by an acute rim g silken hairs. The beak of the ♀ does not equal in her of the two preceding species, but is, in most case the body; the posterior margin of the hind femoral e pygidium is very pilose and fimbriate, and the scape o. ... is short—about equal to the first two joints of the funicle (sometimes shorter and sometimes longer, the relative length of these parts not being a constant). The careful observance of these characters will readily separate it from any of its allies.

B. nasicus Say.—This species was bred abundantly from the acorns of the white and chestnut oaks, and six examples from those of the scarlet. The first example appeared June 1st, and one or two daily till July 6th, between which and the 16th about one hundred and fifty were observed, and scattering ones till the present writing (Oct. 1st). Some larvæ and pupæ are still in the earth. In nature, this species is taken here by beating from about the 10th of May till the last week in July in great abundance, and individuals occur till near October. The prevailing colour of the vestiture above is ochreous, variegated on the thorax and elytra more or less with brownish markings, many examples, however, are nearly uniform in colour, varying from pale ochreous to dark brown, and I have a specimen from Florida that might be called cinereous. The beak of the ♀ is about the length of the body in the majority of individuals, and in the remainder either longer or shorter in about equal numbers. The species may be distinguished at a glance from all others except *caryæ* by the larger posterior femoral tooth, the hind border of which meets the femur at a right angle, with no tendency to become sinuate or obtuse.

B. caryæ Horn.—This species has not been taken here, and was not

bred, as I could not obtain last year any hickory nuts containing larvæ, but as more success was had this season I hope hereafter to make known whether *caryæ* will be developed. It is somewhat difficult to find infested hickory nuts, as comparatively few are attacked. The *Carya glabra* seems to be preferred, next the *C. alba* and *C. amara*, while *C. tomentosa* and *maxima* are nearly exempted. From one to eight larvæ will inhabit a single nut, their size not being affected by the number. Many of them never attempt to gnaw out of their bony habitation, but when full fed shrivel up and die. In size they equal the larvæ of *proboscoideus*. Some of the nuts are also depredated on by a lepidopterous larva, apparently the same as one of the four species I find in acorns. This is not an inquiline, but feeds on the kernel either with the *Balaninus*, or by itself, there being seemingly no place of entrance. Two other species inhabit the thick hulls of *tomentosa* and *alba* which I hope to rear. This species averages larger than *nasicus*, which it much resembles, but differs by the larger femoral teeth; the tibiæ more strongly mucronate at tip, and the narrow hair-like (not oval) scales below. The ♀ beak is rather longer; the last ventral more deeply impressed, and the antennal scape about equals four joints of the funicle. My specimens were bred by Dr. Levette, of Indiana, from *C. olivæformis*, Pecans.

B. uniformis Lec.—This species was bred from the acorns of all the biennials in about equal numbers, and three examples from those of the chestnut oak; forty-two specimens were taken in all—not nearly so numerous as *quercus* with which it was reared. The first example was seen June 21st, and none after August 1st. The individuals were very uniform in size (5.5 to 6.5 mm. in length) and color, being all clothed with cinereous pubescence of a scaly nature, and the elytral intervals variegated with darker spots. My specimens from Texas and New York are exactly similar. This is not the typical color. The species was described from examples taken at Sacramento, California, and at Steilacoom, Washington, which were "concolorous" and "densely fulvo-pubescent," but colour is of no value in the species of this genus. The nostrum of all the females seen was shorter than the body; the antennal scape short, about as long as the first two joints of the funicle. The femoral tooth in both sexes is comparatively small, with the posterior edge deeply sinuous. This and the foregoing ♀ characters will help to distinguish this species, but in case of doubt, reference in this, as in all other

...are nearly uniform. Compared with *uniformis*, this
robust facies; the claw appendices are broader; th
d ♀ is much thicker and black altogether, or at le
f the antennæ, the base being in both sexes p
♂ more or less striated. The scape of the antenna
length to that of three of the succeeding joints of tl
the femoral tooth is stronger than in *uniformis*,
lge oblique and less sinuate; the last ventral of the ♀ is
strongly pubescent; not at all impressed as in the p
nces are somewhat comparative, but in the absence
nts, this is about all that can be done by descriptio
nature seems to be short lived, as I have never obtain
evious to June 20th, nor after July 15th; till about t
the nut is soft and easily pierced; the puncture for th
tly through the involucre and shell into the kernel

s a nondescript form of *Balaninus* which I did not r
thirty examples were taken in June with *nasicus* in
Klages in Westmoreland County, and about a dozen
d from Mr. S. Auxer, of Lancaster, Pa. It seems to b
niformis and *nasicus*, but cannot well be assigned to
nsity of vestiture, shape of the elytra and colour are tl
but the femoral tooth is much smaller and oblique, a
does not often exceed two-thirds the length of the
acter groups it with *uniformis* and *obtusus*, with the
agrees in having the claw appendices acute, but di
ak thickened and punctured at

(not obtuse), its much less robust and posteriorly attenuated form, and by the more or less impressed last ventral segment of the ♀; *obtusus* is much more sparsely clothed. There are other minor differences, but the above suffice to show that it is not in harmony with any of the species mentioned. From a mixed lot of *nasicus* its separation requires an examination of the femoral tooth in every individual, but mixed with the other two, simple inspection will suffice in the most of cases.

It is quite probable other species of *Balaninus* remain to be discovered, only one species of which is known from the Pacific Coast. A very pleasant and certain way to determine this would be for collectors everywhere to rear them from nuts and acorns and publish the results. Other modes of collecting are not to be relied on, as for example, in twenty years collecting here I only took *nasicus* and *obtusus*, and in chestnut time *rectus*, but all this time all the other species (*caryæ* probably included) were sufficiently abundant.

DISTRIBUTION.

B. proboscoideus.—Middle States westward, Horn; Massachusetts, Blanchard; Tennessee, Illinois, District of Columbia, Ulke; Ohio, West Virginia, Pennsylvania.

B. rectus.—Middle and Southern States, Horn; Arizona, Smith; District of Columbia, Virginia, Ulke; Canada, New York, Massachusetts, Pennsylvania, Ohio, West Virginia.

B. quercus.—Illinois, District of Columbia, Ulke; New York, New Jersey, Pennsylvania, West Virginia, Ohio.

B. nasicus.—Canada to Georgia, and westward to Colorado and New Mexico.

B. caryæ.—Illinois, Ulke; Indiana, Levette; Kansas (Douglas Co.), Snow; Pennsylvania, Klages.

B. uniformis.—Canada to Florida, from the Atlantic to the Pacific.

B. obtusus.—Massachusetts, New Hampshire, Blanchard; Texas, Nebraska, Horn; Ohio, Pennsylvania, West Virginia.

Undescribed form.—Massachusetts, North Carolina, Blanchard; Pennsylvania (Lancaster Co., Auxer; Westmoreland Co., Klages).

Balaninus has a single parasite common to all the species, except that it was not reared from *obtusus;* the larva was not observed while living in that of *Balaninus*, but it forms a tough papery cocoon so thin

nt that the enclosed larva and pupa can be observed. These
by the cell formed by the *Balaninus*, and are shaped much
he large ants, but much larger. The imago is quite graceful,
or being proportionately as long as in *Rhyssa*. Mr. Cresson
escribed this species under the specific name *balanini*, but
d by Mr. W. H. Ashmead, who probably describes the same
he name *Urosigalphus armatus* (Proc. U. S. Nat. Museum,
, but only issued Oct. 1st, 1889). Besides the larvæ of
ose of at least four lepidopters infest acorns, two of which
by the holes made by the *Balaninus* in leaving, and live on
thin. The other two are found with the *Balaninus* larvæ,
eeding on the refuse made by them, but the other depredates
nce of the acorn, and is sometimes found in acorns by itself;
the earth without forming a cocoon. The others formed
ocoons against the sides of the jars in which they were con-
d to obtain their names, the gentlemen of whom inquiries
ing seemingly unacquainted with these forms.

SUMMARY.

oideus is so far only known to depredate on chestnuts.
has been reared here from chestnuts only, but elsewhere
acorns.
was reared in about equal numbers from the acorns of all

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 219, Volume xxi.)

Genus ARCTIA Schrank.

1802—Schrank, Fauna Boica II., 2, 152.

The typical genus of the family—a general favorite with collectors and the source of a good deal of worry and uncertainty to describers. I have seen very large series of specimens of many species, and have seen nearly all the species. From a rather careful study of the species I can see no reason why they should not be as easily recognizable or limited as those of any other Lepidopterous genus—indeed, the problem strikes me as a remarkably easy one, the key to which lies in the fact that no amount of obsolescence of maculation authorizes a species, while change of *pattern* can be easily detected even in specimens with the markings much broken. Reference for general papers, lists, &c., relating to American species, are:—

1816—Hübner, Verzeichniss, 183.
1856—Walker, C. B. Mus. Lep. Het., III., 594, syn. sp.
1860—Clem, Proc. Ac. N. Sc. Phil., XII,, 526.
1873—Stretch, Zyg. and Bomb., 73, fig. and syn. sp.
1876—Moeschl., Stett. Ent. Zeit., 37, 296.
1883—Neumoegen Papilio, III., 150, list sp.
1887—Smith, Ent. Amer., III., 117.

In the paper last cited I give at some length the features to be relied upon for specific separation in this genus.

The head is retracted, tongue weak and short, palpi almost rudimentary, antennæ moderate in length; bipectinated in the ♂, simple in the ♀. The legs are moderate in length, the posterior longer; spurs short and weak, but normal as to number; the tarsi are finely spinulose, the claws simple.

Moeschler, in the Stett. Ent. Zeit., 1876, v. 37, p. 296, says:—*A. nais, phyllira* and *virgo* have a distinct claw on the fore tibia, but I utterly failed to find any trace of it on any specimens examined by me.

A. achaia Grt. & Rob.

1867—Grt. & Rob., Trans. Am. Ent. Soc., I., 3
Arctia.

1868—Bd., Lep. Cal. (Am. Soc. Ent. Belg., XII.)

1873—Stretch,* Zyg. and Bomb., 74, *Arctia.*

1873— " " " 124, pl. 5, ff. 1

1875—Hy. Edw., Proc. Cal. Ac. Sci., V., 187, *A*

1881—Butl., Papilio, I., 131, *Arctia.*

1882—Stretch, Papilio, II., 91, varieties of.

1887—Smith, Ent. Amer., III., 111, *Arctia.*
var. *barda* Edw.

1881—Edw., Papilio, I., 39, *Arctia.*
var. *ochracea* Stretch.

1873—Stretch, Zyg. and Bomb., 124, pl. 5, ff. 18

1881—Butl., Papilio, I., 131, an sp. dist. *Achaia.*

Habitat—No. Calif., Oregon.

A. anna Grt.

1863—Grt., Proc. Ent. Soc. Phil., II., 335, pl. 8,

1873—Stretch, Zyg. and Bomb., 74, 220, pl. 9, f.

1875—Streck., Lep. Rhop. et. Het., I., 106, =*p*

1875—Grt., CAN. ENT., VII., 196, an sp. dist.

1878—Streck., Proc. Dav. Ac. Sci., II., 273, =*p*

1879—Græf, Bull. Bkln. Ent. Soc., I., 4, =var. *p*

1883—Hulst, Bull. Bkln. Ent. Soc., VI., 70, =*pa*

1883—Neum., Papilio, III., 149, =*persephone.*
var. *persephone* Grt.

1863—Grt., Proc. Ent. Soc. Phil., II., 433, *Arcti*

1864—Grt., Proc. Ent. Soc. Phil., III., 77, *Arcti*

1873—Stretch, Zyg. and Bomb., 74, *Arctia.*

1856—Wlk., C. B. Mus. Lep. Het., III., 609, *Arctia.*
1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 71, pr. syn.
Habitat—Penna., N. Y.

The form *anna* is much the least common, being in fact but a suffused form of *persephone.* By the operation of the law of priority this suffused and aberrant form must remain the species, while the normal form remains the variety. It is much more widely distributed than above indicated.

A. approximata Stretch.
1885—Stretch, Ent. Amer., I., 104, *Arctia.*
Habitat—Canada.

A. arge Dru.
1770—Drury, Illustr., I., 35, pl. 18, f. 3, *Noctua.*
1791—Oliv., Enc., Meth., V., 92, *(Phalaena).*
1816—Hübner, Verz., 183, *Arctia.*
1837—Westw., ed. Drury, I., 33, *Spilosoma.*
1841—Harris, Rept. Ins. Mass., 244, *Arctia.*
1856—Wlk., C. B. Mus. Lep. Het., III., 609, =*dione.*
1858—Duncan in Jard. Nat. Lib., XXXII., 174, pl. 19, f. 2, *Spilosoma.*
1860—Clem., Proc. Ac. N. Sci. Phil., XII., 528, *Arctia.*
1862—Harris,* Ins. Inj. to Veg. ed. Flint, 346 *(life hist.)*
1873—Stretch,* Zyg. and Bomb., 74, 225, pl. 9, ff. 10 and 11, *Arctia.*
1874—Lintner,* Ent. Contr., III., 143, *Arctia.*
1875—Grt., CAN. ENT., VII., 196, *Arctia.*
Andrews,* Psyche, II., 79, *Arctia.*
1882—Gilbert,* Papilio, II., 50, *Arctia.*
1887—Smith, Ent. Amer., III., 111, *Arctia.*
dione Fabr.
1775—Fabr., Syst. Ent., 572, *Bombyx.*
1781—Fabr., Spec. Ins., II., 186, *Bombyx.*
1787—Fabr., Mant. Ins., II., 116, *Bombyx.*
1793—Fabr., Ent. Syst., III., 1, 442, *Bombyx.*
1797—Sm. Abb.,* Ins. Ga., I., 125, pl. 63.
1816—Hübner, Verzeichniss, 180, *Euplagia.*

-Pack., Proc. Ent. Soc., Phil., III., 118, pr. syn,
-Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 78, *C*
-Neum., Papilio, III., 150, an sp. dist.
-Grt., CAN. ENT., XVIII., 108, *Arctia.*
-Smith, Ent. Amer., III., 111, pr. syn.
it—Canada to Georgia, Texas, west to California, Va
abundant.
ed food plants are *Plantago* and *Polygonum*, but tl
r.

irt.
-Grt., Proc. Ent. Soc., Phil., III., 523, pl. 5, f. 2, ♀
-Stretch, Zyg. and Bomb., 74, 224, pl. 9, f. 9, ♂, *Arc*
it—Colorado.

i Stretch,
Stretch, Zyg. and Bomb., 74, 76, pl. 3, f. 13, *Arctia.*
Smith, Ent. Amer., III., 111, *Arctia.*
t—California.

dw.
Edw., Ent. Amer., III., 183, *Arctia.*
Bruce,* Ent. Amer., III., 219, *Arctia.*
t—Colorado.
ints are *Plantago* and *Polygonum.*

nd.
Saund., Proc. Ent. Soc., Phil., II., 59, *Arctia.*
Saund., Syn. Can. Arct., p. 13, *Arctia.*

A. cervinoides Strk.

1876—Strk., Proc. Ac. N. Sci., Phil., XXVIII., 151, *Arctia.*

1879—Strk., Rept. Chief., Eng., 1878-79, V., 1860, pl. II., f. 4, *Arctia.*

1887—Smith, Ent. Amer., III., 112, *Arctia.*

Habitat—Colo., July 15.

This will prove an undersized *phyllira*, with black secondaries.

A. complicata Wlk.

1864—Wlk., C. B. Mus. Lep. Het. Supp., XXXI., 279, *Arctia.*

1868—Grt., Tr. Am. Ent. Soc., II., 117, *Arctia.*

1873—Stretch, Zyg. and Bomb., 74, 79, =*dahurica.*

1883—Neum. Papilio, III., 149, =*achaia* var.

A. dahurica Bdv.

1843—Bdv., Icon., Hist. Lep., 126, pl. II., f. 1, *Chelonia.*

1845—H. Sch., Schmett Eur., II., 145, *Chelonia.*

1852—Bdv., Lep. Cal. (Ann. Soc. Ent. Fr.), 49, *Chelonia.*

1856—Wlk., C. B. Mus. Lep. Het., III., 597, *Arctia.*

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 527, *Arctia.*

1862—Clem., App. to Morris Syn., 341, *Arctia.*

1867—G. & R., Tr. Am. Ent. Soc., I., 336, pl. 6, f. 41, ♂, *Arctia.*

1873—Stretch, Zyg. and Bomb., 78, pl. 3, f. 10, ♀, *Arctia.*

1883—Neum., Papilio, III., 150, var. *complicata.*

Habitat—California.

A. decorata Saund.

1863—Saund., Syn. Can. Arct., p. 12, *Arctia.*

1863—Saund., Proc. Ent. Soc., Phil., II., 60, *Arctia.*

1864—Grt., Proc Ent. Soc., Phil., II., 77, pl. I., f. 4, ♀, *Arctia.*

1865—Grt., Ann. Lyc. N. Hist., N. Y., VIII, 369, =*nais.*

1873—Stretch, Zyg. and Bomb., 74, =var. *nais.*

1878—French,* 7th Rept. Ins. Ills., 182, *Arctia.*

1881—French,* Papilio, I., 8, *Arctia.*

1882—French,* Papilio, II., 179, *Arctia.*

1883—Hulst, Bull Bkln. Ent. Soc., VI., 70, =*nais.*

1883—Neum., Papilio, III., 149, an sp. dist. *nais.*

1887—Smith, Ent. Amer., III., 111, =*nais.*

colorata Wlk.

... *mata* and *decorata* referred to
eave the reference as made, since the monographic
may develope the above as the correct conclusion.
ther references.

ıata Neum.
-Neum., Papilio, I., 28, *Arctia.*
ıt—Colorado.

lk.
-Wlk., C. B. Mus. Lep. Het., III., 592, *Euprepia.*
-Grt. & Rob., Tr. Am. Ent. Soc., II., 71, =*mexicana*:
mexicana Grt. & Rob.
-G. & R., Ann. Lyc. N. Hist., N. Y., VIII., 367, pl. 1
-Neum., Papilio, III., 150, =*docta.*
autheola Bdv.
Bdv., Lep. Cal. (Ann. Soc. Ent. Belg., X.), 76, *Chelon*
Stretch, Zyg. and Bomb., 74, pl. 3, ff. 3, 4, *Arctia.*
Butler, Ann. & Mag., N. H., Ser. 5, VIII., 310, =*doct*
Neum., Papilio, III., 150, =*docta.*
ırizonensis Stretch.
Stretch, Zyg. and Bomb., 217, pl. 9, f. 4, *Arctia.*
Stretch, Rept. Surv. West. 100 Mer., V., 799, pl. 46, ff.
3, = var *docta.*
Neum., Papilio III., 150, = *docta.*
–Ariz., Calif., Mexicana.
ler.
ıtl., Ent. Mo. Mag. XVIII., 136, *Arctia.*
-Unknown

NOTE ON THE LARVAL ORNAMENTATION OF THE N. AM. SPHINGIDÆ.

BY A. R. GROTE.

In my "Hawk Moths of North America," I have assumed that the caudal horn is a prolongation of the skin itself, stiffened by chitine (p. 41). It supports a bristle, or pair of bristles, and Dr. W. Müller, whose valuable work on the *Nymphalidæ* of South America in their larval stages (Zoologischen jahrbuchern, 1886.) I have noticed in these pages, figures the horn of *Dilophonota*, p. 249, and regards it as a prolongation of the base supporting the two normal bristles of the eleventh segment. We may assume that the caudal horn is a later development, and that the surmounting bristles were originally sessile as in the *Attacinæ*. The bristles themselves may have disappeared, and the horn itself, the prolongation of the base, remain. I would draw attention to this character as supporting generally my arrangement of the family. The thoracic "horns" of *Ceratomia* are probably homologous with those of *Citheronia*. This character, together with the comparatively sunken head and soft brown colors of the moth allies *Ceratomia* with *Triptogon*, as I have pointed out. Dr. Wm. Müller concludes that the caudal horn of the Hawk Moths is the remains of what was once a system of bristles, and that there is a perfect homology with the *Saturnidæ*. This entirely agrees with my idea as to the derivation of the family, which may have thus been thrown off from the Spinners in a parallel direction with the *Ceratocampinæ*, The modern *Smerinthinæ* remain as the descendants of intermediate phases, the ocelloid spots and colors of the moth are retained. In this sense they are synthetic characters appearing in the other three or four groups which are to be referred to Smerinthoid affinities. The relatively small and sunken head, and the square prothoracic parts, the pectinate antennæ, are probably low characters in the Hawk Moths, recalling the Bombyces. In this view the shape of the body in *Hemaris* and allies is a point of widest departure, and warrants the position I assign to the *Macroglossinæ*. The method of pupation needs further elucidation. It must be studied in this group, with regard to the physical nature of the surface. Probably the cocoon is older than the absence of silk, the tendency to spin silk appearing by reversion in species to-day where it seems to have become gradually lost as a character. The change to pupation in the earth may have had some relation to changes in the surface conditions in past ages.

DESCRIPTIONS OF LEPIDOPTEROUS LARVÆ,

BY WM. BEUTENMÜLLER, NEW YORK.

MAMESTRA LOREA, Güen.

Head black, with dirty, whitish, irregular markings; antennæ pink. Body of a dirty, creamy, brown color, except the first three segments blackish. Along the dorsu f lozenge shaped blackish patches, one on each segn sum are also two rows of minute piliferous spots and ch side, where there is also on each segment an ill-defin ish stripe. Underside semi-translucent whitish, with a n piliferous spots which bear a short pale brown hair, as above. Thoracic feet pale brown. Length 34 mm. (1st. Imago emerged May 18th. Food-plants, strawbe ium.

PHYCIS RUBIFASCIELLA,]

Head deep chestnut br uth parts whitish, cervical shield chestnut brown. Body brown, with a pinkish hue; on each side of the body are scattered a few minute piliferous spots each, with a short pale brown hair; on each side of the first and second segment is a shiny black spot. Thoracic feet black; abdominal leg concolorous to the body, which is the same as above. Length, 13 mm. Collected May 30th. Imago emerged June 17th. Food plant, alder. Living in a horn-shaped case. Another form of this species was published by me in the Ent. Amer., V., p. 38.

SALEBRIA CONTATELLA, Grote.

Head jet black, shining, as is also the cervical shield. Body pale green, with a series of about four or five longitudinal stripes, almost of the same hue, along each side, where there are three rows of minute piliferous spots, each bearing a short, light brown hair. Underside of body same color as above, except the first segment, dull black. The segments slightly decrease in size toward the posterior portion of the body. Length, 15 mm. Food-plant, locust *(Robinia pseudacacia)*. Living singly between two leaves spun together flatly. June 5th. Imago emerged July 8th.

BOTYS FISSALIS, Grote.

Head small, pale brown, shiny; mouth parts pitchy. Body very shiny, yellowish white, semi-translucent, with a number of piliferous spots concolorous to the body, except those in the first, second and third seg-

ments, which are brown. Each spot with a light brown hair. The cervical shield same color as the body; lateral edges brown; underside same as above; thoracic feet tipped with brown. Length, .24 mm. Food-plant, asters; drawing together several leaves so as to form a bunch. May 31. Imago emerged June 18th.

SALEBRIA CELTELLA, Hulst (MS.)

Head pitchy black, with irregular, dirty, whitish markings, and an oblique stripe of the same color on each side. Body pale green, with a number of pea green, equidistant, longitudinal stripes, as broad as the intervening spaces. Cervical shield jet black, and on which the stripes of the body are sordid white. Along the subdorsum is a row of minute piliferous spots, and two rows along the sides. Body beneath green, and without marking, except the first segment is jet black, as are also the first pair of thoracic feet. A few hairs are also scattered over the body. Length, .22 mm. Food plant, *Celtis occidentalis*, folding together a few of the terminal leaves. Aug. Spins a rude cocoon between leaves.

NOTE ON THE GENUS CROCOTA AND PROF. J. B. SMITH.

BY A. R. GROTE.

Readers of Mr. Smith's papers will have noticed the frequent critical remarks at my expense, and it may have appeared to them that I have been often most culpable. But, in every case, although I have not the pleasure of knowing all of Mr. Smith's publications, these criticisms can be shown to be perversions of the case. So in the genus *Crocota*, in which determinations are difficult, Mr. Smith says (p. 193, vol. XXI.):— "The matter has been further confused by Mr. Grote's persistent refusal to refer to Mr. Reakirt's species," and further that "he ignores them altogether." I ask anyone how I can "confuse" the "matter" by simply not referring to Mr. Reakirt's species by name, seeing that I do not know these species, have never seen the types, and am not disposed to believe in them? And, moreover, since Mr. Reakirt's descriptions refer to Eastern species, *postdating* my own, and those of other author's which I discuss, if they are not distinct species they are thus clearly synonyms, and Mr. Smith says the descriptions may be "poor," as indeed they seem to me to be. But the whole statement is inaccurate, for everywhere,

where I have referred collectively to the species of *Crocota*, I have also expressly referred to Mr. Reakirt's descriptions, giving my reasons for not particularly citing the species by name. Hence, my writings have had the exactly contrary effect, to that stated by Mr. Smith, "of causing others to lose track of" Mr. Reakirt's "descriptions." I always reminded students of the existence of M ptions, though I confessed I could not make them out. apparently any wiser than I. I did, indeed, suppose t a synonym of *opella*, or founded on the dark form I kept this and all other surmises to myself, because data to go upon, and a scientific writer must, in suc asonable certainty. With regard to *læta*, I, in my first refer *treatii* here, to show that I had probably rediscov own species since Boisduval's figure. I first, in fact, this unrecognized figure, which has been copied in me belongs the credit of directing Mr. Smith's attention to this figure of *læta* and its probable identity with *treatii* in my first Check List. This identification is not quite assured in the absence of any description; hence, in my new Check List, I made a query. If Mr. Smith had written correctly and impartially on the genus *Crocota* he should have said: Mr. Grote first refers this genus to the *Arctiinæ* on account of the presence of ocelli, and removes it from the *Lithosiinæ* where he leaves *Ameria*. Further, Mr. Grote has figured the species he described in Proc. Ent. Soc., and no doubt exists, in a confusing genus, of the species he intended. Instead of this, with the evident intention of making an adverse criticism *coute qui coute*, we have the perversions above exposed. As was the case when Mr. Smith replied to my statement, that, in the *Deltoidinæ*, the eyes were always "naked," that in one genus the eyes were "lashed" (as if these characters were contradictory or exclusive), it must seem clear that the limit of proper criticism is exceeded by Mr. Smith. The errors of an author must be judged by the material at his command in specimens and literature. If under all the circumstances under which he laboured his work is of a character virtually to advance the study of his subject, and if a large proportion of his determinations are accurate and in the state of the science very opportune, no right-minded person should be able to bring himself to prevert such labours. I may remark, in conclusion, that I do not regard *Cydosia*, *Cerathosia* or *Gnophæla*, as *Arctiinæ*, and I believe

that they are thus incongruously placed and associated. Both *Cydosia* and *Gnophæla* appear to me to be *Zygænidæ* with Bombycid analogies *in sensu* Packard. I hope Dr. Packard may be induced to study these forms. Neither do I believe our Texan species of *Cydosia* to be the *nobilitella* of Cramer. But all these questions, which ever way a full knowledge of these moths my determine us, must be entered into without temper and without unnecessary animadversions upon those whose experience has led them to opposite conclusions from those reached by the final verdict, a verdict which Mr. Smith's studies will, we may hope, be of a character to influence.

NOTES.

NOTES OF THE YEAR.

Dear Sir: With few exceptions insects were unusually scarce last season, probably on account of the continued cool weather and heavy rains. *Colias Philodice*, generally so abundant, was almost entirely absent, a few appeared in midsummer and the fall brood was more plentiful, but by no means abundant, and the latter might be said of most of our diurnals. The Noctuas were also conspicuous by their absence, at least at sugar, the baits failing to attract even the commonest species. *Eufitchia ribearea* was observed in numbers in a plot of black currant bushes, in an old orchard now included in Mount Royal Park, and *Orgyia leucostigma* was abundant on shade trees about the city. In the fall I found several species of *Eristalis* common on solidago blossoms, *E. Bastardi* and *E. Brousi* being especially abundant, while *E. transversus*, *E. Tenax* and *E. dimidiatus* were less common. The other orders were poorly represented, making it one of the worst collecting seasons in my experience.

F. B. CAULFIELD, Montreal.

ACKNOWLEDGMENT.

Dear Sir: The photograph from which the beautiful figure on p. 204, vol. xxi. of *Papilio Turnus* (aberrant form) was taken by Mr. H. N. Topley, of Ottawa, by the new Isochromatic process, and the engraving was made direct from the photograph. This acknowledgment should have appeared in the article, but was accidently omitted from the proof.

J. FLETCHER.

A CORRECTION.

Dear Sir : In my note which appeared in your November number, I wrote, through inadvertence, *Phytolacca decandra.* The plant I referred to is *Veratrum viride*—not the "Garget," but the "Indian Poke" or "Poison Poke." I am ashamed at having to take up valuable space with a correction.

THOMAS W. FYLES.

CO E.

TI

Dear Sir : The cotton *lina*, Say). This interesting moth has been tolerably the middle of September in this district, and is as mucl cal conundrum as ever. I took several specimens rou ghts. They seemed quite fresh and presented no appe vel-worn by their supposed journey from the cotton fie of Dixie" I captured two specimens on September 19 and endeavoured to hibernate them but failed, one dying on October 12th and the other on October 15th. I hope to make another attempt at some future day. It does seem curious that we cannot solve the problem of the northern food-plant of this moth.

E. BAYNES REED, London, Ont.

CHRYSALIDS DEVOURED BY CATERPILLARS.

Dear Sir : A few days ago I found a number of *Pyrameis cardui* larvæ and also several (4) of the common reddish brown hairy caterpillars *(Spilosoma Isabella)*, so often seen about gardens in the fall feeding on plants of the common garden hollyhock *(Altheæ rosea)*. Not having extra boxes to spare I placed both species in a roomy pasteboard box with a plentiful supply of hollyhock leaves. In the course of a day or two several of the Cardui larvæ hung themselves to the corner of the box, and in a short time three more transformed to chrysalids. What was my surprise on looking into the box this morning to see if any more had hung or transformed to find the reddish brown caterpillars had devoured two of the Cardui chrysalids, and one of the caterpillars was actually engaged eating the third and had consumed fully one-half of it. This was not done from lack of food, as there was an *abundance* in the box. Here, then, is a new source of destruction to our butterflies—a sort of cannibalism among caterpillars.

SHELLEY W. DENTON, Wellesley, Mass.

Mailed January 9th.

The Canadian Entomologist.

VOL. XXII. LONDON, FEBRUARY, 1890. No. 2.

DESCRIPTION OF A NEW SPECIES OF MELITÆA FROM SOUTHERN CALIFORNIA.

BY W. H. EDWARDS, COALBURGH, W. VA.

MELITÆA AUGUSTA.

Male.—Expands from 1.6 to 1.75 inch; belongs to *Chalcedon* group, but is as conspicuously red as the species *Chalcedon* is black; upper side black, the surface nearly covered with light red and pale yellow spots, disposed as in the group; the basal areas dusted with yellow scales, which, on primaries, extend along both margins; costa of same wing edged red; both hind margins bordered by small red spots, varying in shape, sometimes narrow and as of a broken stripe, sometimes more or less rounded or ovate; the spots of second row are small, lunular, largest on secondaries, edged with red, the interior being yellow, or they are nearly all red with a small yellow patch in middle; sometimes this yellow is thinly washed red; the third row on primaries is either wholly yellow, or yellow with red edges, particularly on the outer side; on secondaries wholly red, and often very deep, so as to make a conspicuous broad band; the fourth row on primaries is red, sometimes with the spots next the two margins either yellow or in part yellow; around the end of cell yellow spots four or five in number; in the cell spots of red and yellow alternately, four in all, the yellow one at base more or less stained red; two yellow spots below cell with black ground between, and nearer base a small duplex red one; the fourth row on secondaries is yellow, either of small spots or pretty large ones, and the three or four from costal margin are red on their outer sides; a red stripe outside the cell from the end to costal margin; two small yellow spots inside cell, with a red one between them and a yellow spot below; fringes yellow, black at the tips of the nervules. Some examples have scarcely any yellow, the yellow having been replaced by red, or tinted red.

Under side of primaries red, the yellow spots repeated, enlarged, and

of clear color; outside end of cell a large suboval red spot heavily edged black, and the cell is crossed by two wavy black lines.

Secondaries have the margins red, in a continuous band; the second row yellow, on black ground, lunate; the third row red, rounded on inner side and edged narrowly with yellow on all sides but the exterior; the fourth row yellow, cut unequally from one margin to the other by a black line; thence a triangular yellow spot at end of cell, and in a straight margin three yellow spots, one on margin and partly in e, one at top of cell, the third in lower median interspa he fourth row is expanded towards base along inner marg ppearance of a fourth spot to the basal row; the shoulder ta yellow.

Body above black; red ; thorax beneath yellow; abdomen red at sides, yellow al end; legs red; palpi red; antennæ pale red-brown, annul ove, red below, club black on upper side, the tip ferrugino d-brown.

Female.—Expands from 1.7 to 2.2 inches.

Like the male in general, but the spots larger in proportion; on the underside, the spots of second row on each wing are large, lanceolate, the outer side deeply incised. In occasional examples the outer part of upper side of secondaries is covered by a broad red band in place of the spots of second and third rows, and this area is separated from the narrow marginal band by a black line.

In an aberration there is no trace of yellow on upper side, and on the under side of secondaries the yellow bands from margin to cell are replaced by wood-brown, while the yellow basal spots are obscured.

I name this species *Augusta*, in memory of the late Mrs. W. G. Wright. Mr. Wright has taken it in vicinity of San Bernardino abundantly, and writes of it thus: "*M. Augusta* is found on top of the mountains, elevation 5,000 feet, and is not found at all till you reach the top. They do not descend the mountain sides, nor are they found in the canyons. On the summit oak and pine trees are scattered, and the ground is covered with grasses and flowering plants. The butterfly seems all the time on flowers, and is a great feeder. I have never seen a

pair in copula, nor a female ovipositing, and I know nothing of the early stages. Every year I find *Augusta* at the same place, in the month of June."

It seems to me probable that *Augusta* will be found in Utah and Arizona, perhaps also in Nevada.

TENTHREDINIDÆ COLLECTED AT OTTAWA, 1889.

BY W. HAGUE HARRINGTON, OTTAWA.

The past season was not a favorable one for the collection of Hymenoptera. The early spring was very fine and warm, but was followed by prolonged spells of cool and rainy weather, which not only made collecting difficult, but appeared to destroy many of the insects. This will be seen by the following list, in which a large proportion of the species are represented by single specimens. It contains about eighty species, or nearly two-thirds of those that have so far been taken in this locality.

Few of the species were at all common, the most abundant and destructive being *N. Erichsonii* Hartig., which we now find wherever there are larches, and by whose larvæ these trees are defoliated and injured. *N. Ribesii* Scop. *(ventricosus* Hartig.), the gooseberry saw-fly, and *H. maculatus* Norton, the strawberry saw-fly, were also numerous. On the other hand several of the species, especially of Macrophya and Tenthredo, which are usually common in midsummer, were not observed, and there was a noticeable scarcity of larvæ.

Cimbex americana Leach, var. *decemmaculata* Leach, female, June 16.
var. *La Portei* St. Farg., male, May 11.
Trichiosoma triangulum Kirby, male, May 12.
Abia Kennicotti Norton, female, May 11.
Hylotoma clavicornis Fabr., female, June 13.
McLeayi Leach, female, May 10.
Priophorus æqualis Norton, female, July 14.
Pristophora identidem Norton, male, May 27 ; male, June 16.
tibialis Norton, female, May 12 ; female, June 26.
Euura orbitalis Norton, three females, May 24.
Nematus aureopectus Norton, female, May 9; two females, May 10; female, May 18 ; female, May 27.

bivittatus Norton? female, May 11.
corniger Norton, male, May 17; male, May 24; male and female, May 27; female, June 2; male, June 16; male, Aug. 8.
Erichsonii Hartig., female, abundant from May 19; male, June 15.
latifasciatus Cresson, female, June 7.
malacus Norton, female, May 18.
mendicus Walsh, one male , May 9; female, May 17; female, June 26.
pleuricus Norton? female,
Ribesii Scop., female and 1 May, June.
Several species not yet exa ne.
Emphytus apertus Norton, fem May 17; female, May 18; female, May 27; fe
hullensis Prov., female, Ju
mellipes Norton, male, Ma ay 24.
Harpiphorus maculatus Norte male abundant, May 9 to June 26.
Dolerus albifrons Norton, seven males and two females May 24.
aprilus Norton, male and female, May and June, common.
arvensis Say, female, April 19, May and June, common.
bicolor Beauv., female, May 27.
collaris Say, female, May 10; female, May 19; female, June 2.
unicolor Beauv., male, May 12.
Monophadnus bardus Say, female June 13.
medius Norton, two females, May 11; female, May 18; female, May 24; two females, June 13.
rubi Harris, female, May 12; female, May 27.
Phymatocera canadensis Harrington, female, May 10; female, May 11; female, May 17.
fumipennis Norton, four males and three females, May 17; female and male, May 18; female, May 20; two males, June 22.
Hoplocampa halcyon Norton, female May 11; female, May 17.
Monostegia ignota Norton, two males and one female, May 27.
rosæ Harris, female, May 19; female, May 22; female, May 24.
Selandria flavipes Norton, two males, May 24; male and female, June 2; female, June 8; male, June 13; two females, August 8.
Allantus basilaris Say, female, June 28; male, July 28.

Macrophya externa Say, female, June 26.
flavicoxæ Norton, female, June 13; female, June 23; two females, June 26; two females, June 28; female, July 1.
varia Norton, female, June 20.
sp. female, June 26.
Pachyprotasis delta Prov., male, June 16; female, June 20; one male and two females, June 23; two females, June 30.
omega Norton, male, June 28; male, July 28.
Taxonus albidopictus Norton, female, July 14.
amicus Norton, male, June 16; male and female, June 26.
rufipes Harrington, male, May 18.
unicinctus Norton, female, May 27.
Strongylogaster annulosus Norton, female, May 24.
apicalis Say, female, June 13; female, June 28; male, July 11; female, July 28.
longulus Norton, male, May 24.
luctuosus Prov., female, May 22.
robustus Prov., ? female, June 13; two females, June 28; male, July 1.
soriculatus Prov., female, May 24.
tacitus Say, male, May 24; female, June 8; male, August 8.
Tenthredo eximia Norton, male, May 24; female, June 28.
grandis Norton, female, June 15.
mellina Norton, female, July 7.
ruficolor Norton, female, May 24; female, July 1.
rufipes Say, female, June 2; female, June 23; two females, June 26.
rufopectus Norton, male, June 14; male, June 16; female, June 26; male, July 1.
verticalis Say, female, June 13; female, July 1; female, July 14.
Tenthredopsis atroviolacea Norton, female, June 16; female, June 30.
Lophyrus Lecontei Fitch, two females, (bred) May.
Monoctenus fulvus Norton, one male and two females, May 13.
Lyda canadensis Norton, female, June 26.
luteicornis Norton, female, June 2.
luteomaculata Cresson, female, May 24.
perplexa Cresson, male, May 11; male, May 17.
quebecensis Prov., female, June 30.

THE NOCTUIDÆ OF EUROPE AND NORTH AMERICA COMPARED.

(Fifth Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

T[illegible].

The vestiture is woolly, a[illegible] distinguishing character from the *Agrotini* and *Hadenini*, [illegible]era much resemble, while the body is hardly tufted; the ra[illegible]ax has sometimes a median ridge. The colours of the [illegible]n shades of brown, red and yellow, like the autumn folia[illegible]ny of the hibernating species hide. The eyes of the first [illegible]ry; in several the tibiæ are spinose, the reverse being us[illegible] Whether our, mostly western, species allied to *Perigrapha*[illegible]ictly congeneric, I have not been able to decide. *Acerra*[illegible]imple antennæ in the male; the ornamentation in most cases suggests the relationship. There are two European species of *Perigrapha* against seven related North American species. The genus *Tæniocampa* has twenty-two described American species and only eleven European; among these is one, *alia*, identical. I have not a particle of doubt that for this genus the term *Graphiphora* Hübn., must be retained. My efforts to place the generic nomenclature upon a final basis, by fixing the types in 1874, has met with thoughtless opposition and incorrect criticism. The question of whether Hübner, or others,held our modern (supposed by empirics infallible) ideas upon genera, is quite beside the question of the oldest and therefore proper name for a genus. I have exposed this sort of reckless criticism in the second part of my Check List, 1875, 1876. Only my desire to avoid contention and to enable a comparison of our fauna by the use of the same terms, has induced me to cede the present instance, because the name *Graphiphora* taken from Hübner (to whom we owe almost *all* the leading generic names in the Noctuidæ), had been mis-applied. I think, now, I may have been wrong in this, and that *Graphiphora* should be used, as I originally proposed, with the type *Gothica*, and *Tæniocampa* rejected. Only in this way shall we obtain a stable nomenclature, and the European catalogues must conform, if nearer conclusions are to be arrived at, and lists are to be useful beyond a mere stringing of the different species.

The North American hairy-eyed genera allied to *Tæniocampa* are, further, *Crocigrapha*, with a tuft behind the collar; *Orthodes*, *Himella* and *Morrisonia* (the species of which latter curiously resemble *Actinotia*, but seem to hibernate, being found early in the year on sallows); while I have described American species belonging to the naked-eyed European genera *Parastichtis* and *Anchocelis*. Naked-eyed genera, with armed tibiæ, are *Pachnobia* and *Metalepsis*, occurring in both faunæ, and *Pseudorthosia*, *Choephora*, *Pseudoglaea*, which seem to be American only. *Trichorthosia*, which has hairy eyes, seems to be more allied to *Xanthia*, or *Orthosia*, in the shape of the wings; but, if we do not divide this tribe, as is perhaps unnecessary, it may be ranged with the other hairy-eyed genera, together with the somewhat aberrant *Trichocosmia*. The principal genus is, perhaps, *Orthosia*, of which fourteen European and seventeen American species are described, mostly of a European habitus, and one representative, *ferrugineoides*. While I have referred one identical species *(togata)* to *Xanthia*, which, as distinct from *Orthosia*, contains seven European species, the singular genus *Jodia* Hub. (=*Hoporina* Boisd.), has an American representative of *croceago* in *J. rufago* Hübn. *Eucirroedia* is a modification of the European genus *Cirroedia*; while the peculiar genus *Scoliopteryx* with its one species, *libatrix*, is common to Europe and America, from Hudson's Bay to Virginia, and is probably a survival of the former circumpolar fauna. *Glaea* Hübn. (=*Orrhodia* Hübn., *Crastis* Tr.) has twelve European and only four American species, but the nearly related American genus *Epiglaea*, which differs from *Glaea*, much as *Richia* differs from *Agrotis*, by the presence, namely, of a median thoracic ridge, has five, and *Homoglaea* two described species. Our most beautiful species is *H. carnosa*, in which the egg is also pink in colour. *E. venustula* is said to be the same as *E. sericea*; if the description of the latter is compared, it will be seen to contradict that of *E. venustula* in important points, which remain incomprehensible if the two are really the same. The genera *Ipimorpha* and *Calymnia* have representative, the genus *Cosmia*, an identical species, *paleacea*. While there are a few peculiar genera in both faunæ, such as *Dicycla* in Europe, and *Zotheca* in America, the affinities of the two faunæ in this tribe are strongly marked. The peculiar genus *Scopelosoma* has in Europe one, in America nine species. Of these it is difficult to say which is nearest to the European *satellitia*; the identification of Guenèe's *sidus*

is hence almost impossible; his type also cannot be found. In my opinion he may have had a form of *Walkeri* before him; but whether this, or *vinulenta*, or even *tri-stigmata*, or *Morrisoni*, cannot, with certainty, be made out from his comparative description. As I have separated all the American forms under distinct names, and Mr. Thaxter has shown the distinctness [illegible] by breeding, these names should be retained until furt[illegible] forthcoming as to the single species indicated by Guenèe. [illegible]ourse would be the result of mere opinion and, without s[illegible]ly make confusion.

T[illegible]*i*.

The vestiture resembles [illegible]ding tribe, but the wings are narrower, the legs proportio[illegible]armed. The palpi are short; male antennæ thickly ciliate. [illegible] are blunt, not widening outwardly as much as usual, with gray or brown, streaky, stone-like markings, hence the name *Lithophane*, used for the principal genus by Hübner. This genus is incorrectly called *Xylina;* Hübner's genus of this name having for type a species of *Hadena*. It seems to have been customary for earlier authors to take names out of Hübner's writings and apply them arbitrarily, with or without diagnosis. The injustice and absurdity of this proceeding must be evident to all thinking persons. Only an empiric, full of his own importance and wishing to elevate himself by contrast, can commit the blunder. If Hübner has not given neurational characters, it is because neurational characters were not then known; at least he has not given us incorrect descriptions of the venation, which is in his favor as compared with certain quite modern writers. *Lithophane* has eight European and about twenty-five American species; again a large preponderance. Of these, *Thaxteri* represents the European *lambda;* but no variety of the latter corresponds with our American form, which must be regarded as a distinct representative species accordingly. The European *ingrica* seems to be represented also by *pexata* and its variety *Washingtoniana*, although in the latter instance nearer comparisons are necessary, which I have not been able to make. *Lithomia* Hübn., which differs by the character of the palpal vestiture and the elevated collar, has apparently a representative species in *germana;* but I strongly suspect that this is really identical with the European *solidaginis*. *Calocampa* has

two European and apparently four American species, one of which is unknown to me; of the other three, *nupera* is said to represent the European *vetusta*, although perhaps identical with it; *cineritia* has the widest range, while both this and *curvimacula* are quite different from either of the European forms. The representation of this tribe in Europe is covered by the American forms.

Tribe *Cucullini.*

The elongate wings are sharply pointed, the collar hood-shaped; the abdomen is tufted terminally and extends beyond the proportionately small secondaries. The European species (43) greatly outnumber the described American forms (11). There are a large number of closely related species in the European fauna, many of comparatively recent detection. Perhaps more remain to be described in North America, though it is probable that both this and the next tribe will show an excess of European forms. The specific groups seem to be represented in America. I do not know, however, *luna*, which appears to be allied to the European silvery forms. In addition we have a Californian species, *matricariæ* Behr. (=*serraticornis* Lintr.), which has pectinated ♂ antennæ; I have doubted its being a true *cucullia.*

Tribe *Cleophanini.*

I have referred to *Cleophana*, two American species with hood-shaped collar and the facies of *Cucullia*, but with a claw to the front tibiæ. The other European genera, *Epimecia*, *Calopharia*, I have not recognized. *Nyctophœata* I believe to be a Heliothid form.

Tribe *Euteliini.*

In this tribe of smaller moths, the wings are more or less extended in repose, in the American genus *Marasmalus* folded like a fan. The small secondaries ally them to *Cucullia.* The antennæ have a basal tuft; the collar cut out behind, not hood shaped; the abdomen more or less tufted; the eyes naked. The American *Ripogenus pulcherrimus*, a rare moth, seems to be related to the European *Eutelia adulatrix.*

Tribe *Ingurini.*

The male antennæ are simple at tip. An American form coming to our fauna probably from the south. The form resembles the preceding tribe, but the wings are entire. The species of the single genus *Ingura* are small moths, resembling the species of *Abrostola* in ornamentation, except, perhaps, *oculatrix*, which is a pretty, singularly marked moth.

T

Thinly or closely scaled unt h rather broad and pointed wings and slimy vestiture, t ppers. *Anomis* has uneven margins to the primaries. *A* ton worm") has them even, somewhat sickle-shaped. *Pte* *ytoryza* have peculiar clear spots and structure of the fore- be is American, and comes to our fauna from the south.

Trib *i.*

Larger species with Plusia-like palpi, untufted, with brown wings, having curious ocellate markings and metallic points on secondaries. *Hatney* from Cuba, *confligens* from the west coast, *futilis* from Florida, all belonging to *Litoprosopus*, and are tropical American forms intruding into our territory in the south.

Tribe *Calpini.*

The fore-wings are wide, with pointed apices, full external margin, a tooth on inner margin. Eyes naked, lashed. Palpi prominent, hirsute to the tips, terminating bluntly as if cut off. A single genus and species in Europe, *Calpe capucina*, has apparently an American representative in *C. canadensis* Beth. I have not been able to study other genera, indicated by Guenèe and figured by various writers. This tribe would seem to be tropical in its origin. The genus *Calpe* probably belonged to the tertiary circumpolar fauna, and is of so pronounced a form that the American and European descendants have retained a decided resemblance. I do not know that *Canadensis* has been bred or carefully compared with its European ally, but I was able to recognize type specimens among Mr. Walker's synonyms and somewhat confusing generic references in this family. Full and careful comparisons are needed in many cases to decide whether the species are representative or identical.

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 14, Volume xxii.)

A. doris Bdv.

1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg.), 77, *Chelonia.*

Habitat—So. California.

I am not aware that any reference of this species to the rank of synonyms has been made. It refers almost certainly to one of our western species now known under another name. Mr. Grote has omitted the species from his list.

A. edwardsii Stretch.

1873—Stretch, Zyg. and Bomb., 74, 77, pl. III., f. 9, *Arctia.*

1883—Neum., Papilio, III., 149, =*achaia ?*

1887—Smith, Ent. Amer., III., 111, =*dahurica.*

Habitat—California.

A. excelsa Neum.

1883—Neum., Papilio, III., 70, *Arctia.*

1883—Hulst.,* Bull., Bkln. Ent. Soc., VI., 69, =*nais.*

Habitat—No. Car., New York, Long Island.

Food plant—Plantago major.

A. elongata Stretch.

1885—Stretch, Ent. Amer., I., 105, *Arctia.*

1885—Neum., Ent. Amer., I., 93, =var. *determinata.*

Habitat—Was. Terr.

The curious anomaly of a species being referred as a synonym before it was described arose from the fact that Mr. Stretch, basing his species upon Mr. Neumoegen's material, returned the specimens before sending in the papers for publication. Mr. Neumoegen, working on the genus, made the reference from the label, and both gentlemen sent in their papers for publication at nearly the same time.

A. figurata Drury.

1770—Dru., Illustr., II., pl. XII., f. 4, *Bombyx.*

1820—Pal., Beauv., Ins. Afr. et. Am., Lep., p. 265, pl. 24, f. 4, [1], *Phalæna.*

1837—Westw., ed. Dru., Illustr., II., 22, *Nemeophila.*
1837—Harris, Cat. Ins. Mass., 73, *Arctia.*
1856—Wlk., C. B. Mus. Lep. Het. III., 625, *Nemeophila.*
1862—Clem., App. to Morris, Synops., 341, *Arctia.*
1865—Grt. & Rob., Ann. Lyc. N. Y. VIII., 368, *Arctia.*
1873—Stretch, Zyg. and *ia.*
1879—Graef,* Bull., Bkl. 3, life hist.
1883—Hulst., Bull. Bkln. 70, =*nais.*
1887—Smith, Ent. Amer., p. dist.
ceramica Hbn.
1816—Hbn., Verz., 180,
1865—Wlk., C. B. Mus. I 625, pr. syn.
var. *franconia* Ed
1887—Edw., Ent. Amer., *ia.*
Habitat—Can., N. Y., M.). C.

The distribution is undoubtedly wider, and, as certainly, some of the described species must fall in as forms of this.

A. flammea Neum.

1881—Neum., Papilio, I., 9, *Arctia.*
1883—Hulst., Bull. Bkln. Ent. Soc., VI., 70, =*nais.*
1883—Neum., Papilio, III., 149, =*placentia* var.
Habitat—Florida.

A. f-pallida Strk.

1879—Strk., Rept. Eng., 1878–79, v. V., p. 1860, pl. II., f. 3.
1883—Hulst., Bull. Bkln. Ent. Soc., VI., 70, =*nais.*
Habitat—Rio Navajo, Colo., July 13.

This is simply a variety of *figurata*, in which all the marking save those forming a distinct ⊔, are obsolete. Any good series of *figurata* will show such specimens.

A. geneura Strk.

1878—Strk., Proc. Dav. Ac. N. Sci., II., 270, pl. IX., f. 5, ♂, *Arctia.*
1884—French, Papilio, IV., 158, ♂, *Arctia.*
1889—French, CAN. ENT., XXI., 162, *Arctia.*
Habitat—Colo. (Gilpin Co.), Mt. Shasta, Calif.

Mr. French seems rather inclined to believe that the California specimens may refer to a distinct species. There is a series of *geneura* in the

U. S. National Museum, and this species, *incorrupta* Edw., with all its variations and *nevadensis*, G. & R., are all forms of a single, not very variable species, of which *docta* is the Californian form, and perhaps specifically distinct. The material in the National Museum will go far towards settling the relationship of these forms. The description of new species would be therefore rather unwise until this material can be properly studied.

A. michabo Grt.

1875—Grt., CAN. ENT., VII., 196, *Arctia.*
1883—Neum., Papilio, III., 150, =*arge.*
1886—Grt., CAN. ENT., XVIII., 108, an sp. dist.
1887—Smith, Ent. Amer., III., 111, an sp. dist.
Habitat—Nebraska, Dist. Col.

A. nais Dru.

1870—Drury, Illustr., I., pl. VII., f. 3, *Bombyx.*
1816—Hübner, Verzeichniss, 183, *Arctia.*
1823—Hübner, Zutr,* 300, ff. 599, 600, *Arctia.*
1837—Westw., ed. Drury, I., p. 15, *Spilosoma.*
1856—Wlk., C. B. Mus. Lep. Het., III., 609, *Arctia.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 528, *Arctia.*
1862—Clem., App. to Morris Syn. 339, *Arctia.*
1864—Pack., Proc. Ent. Soc., Phil., III., 177, *Arctia.*
1868—Grt., Trans. Amer. Ent. Soc., II., 117, *Arctia.*
1868—Saund., CAN. ENT., I., 27, *Arctia.*
1873—Stretch, Zyg. and Bomb., 74, *Arctia.*
1876—Moeschl., Stett. Ent. Zeit., XXXVII., 296, *Arctia.*
1882—French,* Papilio, II., 176, life hist.
1883—Hulst., Bull. Bkn. Ent. Soc., VI, 69, 120, *Arctia.*
1884—Bean,* CAN. ENT., XVI., 65, *Arctia.*
1887—Smith, Ent. Amer. III., 111, *Arctia.*

phalerata Harris.

1837—Harris, Cat. Ins., Mass., 73, *Arctia.*
1841—Harris, Rept. Ins., Mass., 245, *Arctia.*
1862—Harris, Inj. Ins., Flint, ed. 347, f. 166, *Arctia.*
1863—Saund., Syn. Can. Arct., 11, *Arctia.*
1864—Pack., Proc. Ent. Soc., Phil., III., 177, *Arctia.*

1868—Grt., Trans. Amer. Ent. Soc., II., 117, pr. syn.
radians Wlk.
1856—Wlk., C. B. Mus. Lep. Het., III,, 632, *Apantesis.*
1868—G. & R., Tr. Am. Ent. Soc., II., 72, pr. syn.
colorata Wlk.
1864—Wlk., C. B. Mus. Lep. Het., XXXI., 302, *Aloa.*
1868—G. & R., Trans. ., II., 85, pr. syn.
1876—Butl., Journ. Lin 32, =*radians.*
var. *incompleta* B
1881—Butl., Ann. and ! r. 5, v. VIII., 311, *Arctia.*
Habitat—Can., U. S., g

The species has been re awberry feeder. Mr. Butler's variety refers to one of thos he maculation partly obsolete, such as any decent series will synonomy of Walker's species has been already referred to e is rather to *decorata* Saund. than to *nais* Dru., but I have ubt of the identity of the two forms. There is, however, a species closely allied to *nais* in the National Museum collection, which is, I believe, as yet undescribed.

A. nerea Bdv.

1868—Bdv., Lep. Cal. (Ann. Soc. Ent. Belg., XII.), 77, *Chelonia.*
Habitat—California.

This species has disappeared from our lists. It is perhaps only a variety of *arge*, but I cannot find that it has been so referred.

A. nevadensis Grt. & Rob.

1866—Grt. & Rob., Proc. Ent. Soc., Phil., VI., 1, pl. 1, f. 1, ♂, *Arctia.*
1873—Stretch, Zyg. and Bomb., 74, *Arctia.*
1885—Neum., Ent. Amer., I., 93, —gives synonomy.
1886—Grt., CAN. ENT., XVIII., 109, *Arctia.*
behrii Stretch.
1873—Stretch, Zyg. and Bomb., 75, pl. 3, ff. 11 and 12, *Arctia.*
1873—Stretch, Zyg. and Bomb., 238, pr. syn.
var. *incorrupta* Hy. Edw.
1881—Edw., Papilio, I., 38, *Arctia.*
1883—Neum., Papilio, III., 71, 150, =*nevadensis.*
1885—Neum., Ent. Amer., I., 93, =*nevadensis.*
var. *sulphurica* Neum. Ent. Amer., I., 93, *Arctia.*
ochracea || Neum.

1883—Neum., Papilio, III., 71, *Arctia*.
1885—Neum., Ent. Amer., I., 93, *nomen bis lectum*.
var. *mormonica* Neum.
1885—Neum., Ent. Amer., I., 93, *Arctia*.
Habitat—Nevada, Arizona, Oregon, Calif.

As I have already indicated, I believe that *geneura* Strk. belongs to this series.

A. obliterata Stretch.
1885—Stretch, Ent. Amer., I., 105, *Arctia*.
Habitat—Unknown.

A. ochreata Butler.
1881—Butler, Ent. Mo. Mag., XVIII., 135, *Arctia*.
Habitat—United States.

Mr. Butler says his species is close to *phalerata*, and after carefully reading his description I believe he is right. At all events I cannot find anything in it that does not apply to *phalerata* as well.

A. oithona Strk.
1877—Strk., Lep. Rhop. et. Het., 131, *Arctia*.
Habitat—Texas.

This will turn out a remarkably close ally to *intermedia* Stretch, which *is not saundersii* Grote.

A. pallida Pack.
1864—Pack., Proc. Ent. Soc., Phil., III., 118, *Arctia*.
1873—Stretch, Zyg. and Bomb., 74, *Arctia*.
Habitat—New York.

The type is in the collection of the Am. Ent. Soc., where I have several times seen it. It is certainly not an *Arctia*, but perhaps nearer to *Seirarctia*.

A. phyllira Dru.
1770—Drury, Illustr., I., 15, pl. VII., f. 2, *Bombyx*.
1791—Oliv., Enc. Meth., V., 94, *Bombyx*.
1797—Abb. & Sm.,* Ins., Ga., II., 127, pl. 64, *Phalæna*.
1816—Hübner, Verzeichniss, 180, *Euplagia*.
1820—Hübner, Zutraege, *108, ff. 215, 216, *Euplagia*.
1837—Westw., ed. Drury, I., 15, *Callimorpha*.

1837—Harris, Cat., Ins., Mass., 73, *Arctia.*
1841—Harris, Rept. Ins. Mass., 245, *Arctia.*
1856—Wlk., C. B. Mus. Lep. Het., III., 610, *Arctia.*
1858—Wlk., C. B. Mus. Lep. Het., VII., 1780, *Arctia.*
1860—Clem., Proc. Ac. N. Sci. Phil., XII., 528, *Arctia.*
1862—Clem., App. to Morr. Synops., 339, *Arctia.*
1862—Harris, Inj. Ins. , *Arctia.*
1863—Saund., Syn. Ca *rctia.*
1876—Moeschl, Stett. XVII., 296, *Arctia.*
1883—Hulst., Bull. Bl I., 70, =*nais.*
1887—Smith, Ent. Am n spec. dist.
var. *lugubris* H
1886—Hulst., Ent. An *rctia.*
Habitat—Penn., N. Y., an., Mass., Ills., Mo., Ga.
The distribution is wider nonomy is once ascertained we can complete the record of

(Continued.)

DESCRIPTION OF THE LARVA OF TRIRHABDA TOMENTOSA, L.

BY WM. BEUTENMÜLLER.

Body elongated, subcylindrical, rounded above and flattened beneath; color above steel blue, with a series of transverse elevated ridges along the dorsum, two on each segment, and along the sides are three rows of tubercles, all steel blue. Body beneath, dirty brownish white; cervical shield also steel blue.

Thoracic feet jet black, shiny; abdominal and anal legs wanting.

Head small, subglobose, depressed in front; shiny jet black.

Mandibles simple, short, stout, slightly excavate internally beneath the apex.

Maxillæ robust, cylindrical; lobe rounded at the apex with a few bristles; palpi three jointed; first joint short, second joint somewhat larger, cylindrical, third joint conical, extending a little beyond the lobe.

Labium subtriangulate, palpi two-jointed, very short.

Antennæ very minute, hardly visible.

Length, about .10 mm; width, about .3 mm.

Food-plants, various species of golden rods and asters. June; single brooded.

NOTES ON THE INSECT FAUNA OF HIGH ALTITUDES IN CUSTER COUNTY, COLORADO.

BY T. D. A. COCKERELL, WEST CLIFF, CUSTER CO., COL.

The faunæ of high altitudes always possess a peculiar interest by virtue of the light they throw on problems of geographical distribution, and especially the distribution in ancient times of what is now a strictly Arctic and Alpine fauna. For this reason, the following lists of species, fragmentary as they are, may be of some value as a contribution to our knowledge of the Alpine fauna of Colorado, and for comparison with Arctic and Alpine faunæ in general. The species here enumerated were taken in 1887, 1888 and 1889, on the eastern slope of the Sangre de Cristo Range, in Custer County, Colorado. Three gulches have been explored, namely, (1) Smith's Park Gulch, on a fork of Brush Creek, (2) Horseshoe Bend Gulch, the next gulch south of No. 1, and (3) Swift Creek Gulch. The great majority of insects came from Smith's Park Gulch. The altitudes are from 10,000 to 12,000 feet. A large number of insects were taken about the Micawber Mine, which is possibly not quite 10,000 feet; but it cannot be far from it, so the species are included. A list of the fauna and flora of the same part of Custer County, *below* 10,000 feet, is now in course of publication in the "West American Scientist." A comparison of the two lists will show that the fauna of higher altitudes differs very materially from that of the valley:—

COLEOPTERA.

These have been kindly identified by Dr. John Hamilton. They are classified according to locality and date of collection:—

(1) Near Brush Creek, June 26 and 27, 1889—

Dolopius lateralis Esch.
Podabrus lateralis Lec.
Orsodacna atra var. *childreni* Kirby.
Cicindela longilabris Say.
Acmœops proteus Kirby.
Adoxus vitis L.
Dichelonycha backii Kirby.

O. childreni and *D. backii* were common. *A. vitis* had the thorax black, and elytra reddish-fulvous.

(2) Near Micawber Mine, 1889—
Chrysobothris trinervia Kirby. A small example.
(3) Horseshoe Bend Gulch, August 15—
Chrysomela continua Lec. Many specimens on flowers of *Gymnolomia multiflora.*
(4) Near Micawber Mine, Aug.
Lachnosterna sp. ♀ (fr
Coccinella transversog
Trichodes ornatus Say.
Buprestis nuttallii ? (f ıot caught).
(5) Micawber Mine, Aug.
Acmaeops pratensis L
Adoxus vitis L.
Zeugophora abnormis I
Anthobium sp.
Mordella melœna Gern.
Leptura propinqua Bland.
" *subargentata* Kirby.
Anaspis rufa Say.
Homalota sp.
Mordella scutellaris Fab.
(6) Smith's Park Gulch, Aug. 5—
Cardiophorus tenebrosus Lec.
(7) Near Micawber Mine, Aug. 4—
Leptura propinqua.
Athous ferruginosus Esch.
(8) Timber line above Smith's Park Gulch, Aug. 5—
Dasytes hudsonicus Lec.
(9) Near Micawber Mine, Aug. 6—
Phyllotreta pusilla Horn. n. sp.
Hippodamia convergens Guér.
Glyptina atriventris Horn, n. sp.
Platystethus americanus Erichs.
Leptura propinqua Bland.
Adoxus vitis L.
Leptura subargentata Kirby.

HYMENOPTERA.

All the Hymenoptera have been submitted to Mr. W. H. Ashmead. The types of the new species are in his collection, and will be described by him.

(1) Near Brush Creek, June 27, 1889—

Bombus rufocinctus Cr.
Prosapis basalis Smith, ♂.
Oryssus occidentalis Cr.
Rhodites spinosellus Ckll., n. sp.
Limneria tibiator Cr.
Odynerus leucomelas Sauss.
Macrophya albipictus Ashm., ♂, ♀.
Camponotus sp.
Orthocentrus leucopsis Ashm.
Eurytoma diastrophi Welsh, ?.

Of *R. spinosellus* only the round pickly leaf-galls were found.

(To be continued.)

CORRESPONDENCE.

CHRYSALIDS DEVOURED BY CATERPILLARS.

Dear Sir: A few days ago I found a number of *Pyrameis cardui* larvæ, and also several (4) of the common, reddish brown, hairy caterpillars *(Spilosoma Isabella)*, so often seen about gardens in the fall feeding on plants of the common garden hollyhock (Altheæ rosea). Not having extra boxes to spare, I placed both species in a roomy pasteboard box, with a plentiful supply of hollyhock leaves. In the course of a day or two several of the *cardui* larvæ hung themselves to the corner of the box, and in a short time three were transformed to chrysalids. What was my surprise on looking into the box this morning to see if any more had hung or transformed, to find the reddish brown caterpillars had devoured two of the *cardui* chrysalids, and one of the caterpillars was actually engaged eating the third, and had consumed fully one-half of it. This was not done from lack of food, as there was an *abundance* in the box. Here, then, is a new source of destruction to our butterflies—a sort of cannibalism among caterpillars.

SHELLY W. DENTON, Wellesley, Mass.

EREBIA EPIPSODEA VAR. SINE-OCELLATA Skinner.

Dear Sir: Is not this variety (CAN. ENT., p. 239) identical with var. *brucei* Elwes, (Trans. Ent. Soc. Lond., 1889, June, p. 326), described as smaller, without ocelli, the red band almost obsolete? *Brucei* was described from high altitudes in Colorado, so it is interesting to have it reappearing at lower levels in N. W. Ter. Mr. W. H. Edwards has kindly sent me the *Epipsodea* plate N. A., whereon are beautiful figures of *Brucei* and the early species.

Dec. 16, 1889. T. D. West Cliff, Custer Co., Col.

GRAPTA ONIS.

Dear Sir: I beg to re re by myself of a beautiful specimen of *Grapta interrog* St. Antoine, Montreal, on the 11th of July. Its sluggish ct condition showed that the insect had but just emerged salis. *G. interrogationis* is extremely rare in the Province of Quebec. Tradition says that it had been, once upon a time, taken at Lachine—a few miles away; but for twenty-five years I have looked vainly for it.

South Quebec, Oct. 16, 1889. THOMAS W. FYLES.

THE CORN SAW-FLY.

Dear Sir: The occurrence in America of *Cephus pygmæus* Curtis, known in England as the Corn Saw-fly, may be worth a special record. In 1887, among insects taken by sweeping in a meadow, I found a *Cephus* not agreeing with any of the described American species. Mr. Ashmead has fully identified it as *C. pygmæus.* In some Hymenoptera received from Mr. VanDuzee a few days ago, I find three specimens, all females, and taken at Buffalo—two on 9th June, 1888, and the other on 11th June, 1889. This shows that the occurrence of the species is not accidental, and that it is already widely distributed. Possibly next season we may hear of injuries inflicted by it upon wheat fields.

W. HAGUE HARRINGTON, Ottawa.

Mailed February 4th.

The Canadian Entomologist.

VOL. XXII. LONDON, MARCH, 1890. No. 3.

POPULAR AND ECONOMIC ENTOMOLOGY.

THE MEDITERRANEAN FLOUR MOTH (*Ephestia kühniella*, ZELLER).

BY JAMES FLETCHER, OTTAWA.

During the summer of 1888 considerable anxiety was caused amongst North American millers by the alarming intelligence that the small Pyralid moth, bearing the name given above, had made its appearance in one of our large Canadian milling centres. There are two or three well-known insects which attack manufactured cereal products; but none of these, have ever occurred in injurious numbers in Canada. When, therefore, it was learned that a large warehouse, twenty-five feet wide, seventy-five feet deep and four stories high, had been completely over-run by the caterpillars of a new insect, which had infested all the flour and other manufactured foods therein contained, and had rendered much valuable machinery temporarily useless, it naturally caused much excitement lest the pest should spread to other mills; nor did this excitement abate when it was announced that the new comer was the same species as had been causing so much loss and trouble in English and European mills during the last ten years. The attack was so severe that it became necessary to close the mill where the outbreak occurred, and also to destroy a large quantity of goods. The insects in all stages were to be found in every part of the building. The cocoons were found adhering to the walls, joists, shelves and ceiling. Every crack or nail hole in the wood-work, machinery and furniture throughout the whole building was found to contain caterpillars or cocoons, and the moths were flying about in thousands. The attention of the Ontario Government was called to

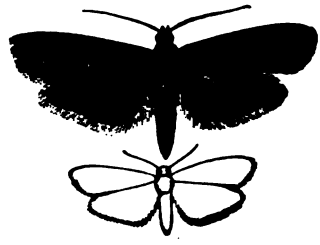


FIG. 2.

the matter in August last, and, under instructions from the Hon. Charles Drury, the Minister of Agriculture, prompt and vigorous steps were taken by Dr. P. H. Bryce, Secretary of the Provincial Board of Health, to ensure the extermination of so dangerous a visitor, which has been described as "the scourge of the Mediterranean ports." Dr. Bryce's investigations and the meth[ods] have been published in Bulletin I. of the Provincial [Board]. This pamphlet, which is written in a clear, intelligible [style] illustrated with figures* of the insect in its various stages, [is] of great use to millers in showing them how to recogniz[e] [the] against the insect should they meet with it upon their [first] [are] valuable sources of information on this subject are [Mrs. Fer]rod's article in her Twelfth Report (pp. 66-72), and Prof. [Comstock] in "Insect Life" (Vol. II., pp. 166-171). The object of [this] is to draw the attention of our readers to the subject, so [that] [the] of the case may be recognized and prompt advice sent either to our Society or to the Ontario Government in case of further outbreak occurring in other parts of the Province. The perfect moth is a slender species about half an inch in length, with the wings folded close to the body when at rest. The upper wings are of a leaden grey colour, more or less sprinkled with black scales and crossed by three waved dark lines, two near together at the tip and the other a little nearer the shoulder than the middle of the wing. Just beyond the middle and in the centre of the wing is a black dot (sometimes two). The under wings are greyish-white, edged by a dark line, and all the wings are conspicuously fringed. The eggs, which are about $\frac{1}{40}$ of an inch in length, are oblong, bluntly rounded at the ends, or sometimes rather kidney-shaped. Under the microscope they are pretty objects, being covered with rather large but indistinct star-shaped prominences, the rays (or wrinkles) of which are waved. As a rule the eggs are laid singly, but sometimes in strings of from three to fourteen, connected at their ends. In nature they are probably laid on the outside of sacks, or are possibly pushed in between the meshes by means of the long ovipositors of the females. One female confined in a glass bottle closed with a plug of cotton batting had forced her eggs into the cotton plug to a depth of over $\frac{1}{4}$ of an inch. When first laid the eggs are greenish-

*Fig. 2, showing *E. kuhniella* enlarged, and of the natural size in outline, is kindly lent by Dr. Bryce.

white, after about twelve days they turn purplish, and in nineteen days (in September and October) the young caterpillars eat their way out of the eggs.

When first hatched they are reddish-brown, with dark heads, slender, hairy, and very active. They at once begin to spin a silken thread wherever they go. When full grown the caterpillar is three-quarters of an inch in length, slender and cylindrical; of a greenish-white, but pink where the skin overlaps. The head is reddish-brown. Upon the segment next to the head, and on the last segment, are two chitinous plates of a honey-yellow colour, known, respectively, as the thoracic and anal shields. Along the sides of the body are four rows of dark piliferous tubercles, the most distinct of which are those upon segments 2, 3 and 13. These tubercles are arranged in four series, as follows:—Subdorsal (two on each segment, from 5 to 12), lateral, substigmatal, and supraventral. The substigmatal series is double throughout, each tubercle bearing two bristles, separated a little at the base. On segments 3, 4 and 13 the subdorsal and lateral series are represented by a single double tubercle instead of two separate tubercles, as on the other segments.

These tubercles are small but distinct, the dark colouring is in the form of a cloud round the bases of the bristles. On the anterior section of segment 13, the two subdorsal rows of tubercles are joined by a dark cloud, and there is a large double conspicuous tubercle in the lateral area, When full-grown the caterpillars crawl to some crevice or corner and enclose themselves in close cocoons, into which they spin particles of flour dust, or any other material at hand. The chrysalis is honey-yellow at first, but turns darker as the moth matures within it. In about three weeks the moths appear, pairing takes place and eggs are laid within 24 hours.

Remedies.—As to remedies, these will have to be applied according to circumstances. In the attack above referred to, all machinery was brushed and subjected to a blast of super-heated steam. Fumigation, with sulphur and chlorine, was also resorted to. The experience of all who have had the misfortune of being visited by this pest is, that the only safeguard is scrupulous cleanliness. In Canada, where we have several months consecutively of severe winter weather, there should be no very great difficulty in keeping this pest down if millers will only recognize the danger of being indifferent. It is hardly probable that cold will kill

the insects if they are left undisturbed in their silken tunnels ; but, if these are broken by constant sweeping, and the caterpillars are left exposed, cold will certainly injure them. Moths and caterpillars placed in a glass bottle, and exposed to a temperature of five degrees above zero (Fah.), were all severely crippled, and did not recover. The above facts suggest the advisability of occasionally opening mills, which are supposed to be infested, so that the cold of w rate. If the moths are seen about in spring, fumigating wit rt interval must be practised. Old sacks received from outsi ld be carefully examined, as these would probable be the means of carrying the pest from one mill to another. It this insect passes the winter in the caterpillar state, in wh or less active, according to the temperature.

SOME NEW COLORADO MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

Cossus Brucei, nov. spec.

Expanse, male 2.50, female 3.00 inches.

Ground color, very pale gray, almost white, no dusky shading over the wing. Fore wings crossed by a great number of fine black lines. In the male none of these form reticulations except a few along the basal half of the internal vein and near the outer margin. The female has a few more of the reticulations in the outer third of the wing. On the male one line more prominent than the rest crosses the wing through the middle from the costa to the posterior margin at the origin of the fourth median vein, forming a straight line. On the female this line follows the fourth median vein about a tenth of an inch, and then goes in a straight line obliquely to the margin, and is not so heavy as in the male. Both sexes have a subterminal line not quite so prominent as the median, from near the apex to the posterior angle, bifid on costa, nearly straight in the male, slightly curved outwardly in the female, reaching the angle in a fine line. Veins dark only as denuded. Hind wings, with a space at the base and along

the inner margin, covered with long hairs as usual, the rest reticulated; of the same color as the fore wings.

Head gray, darker in the male; colar slightly more buff tinted than the ground color of the wings, making a light drab, without marks; thorax gray, a mixture of the ground color of the wings and black, a black line round the posterior margin preceded by a space devoid of black; abdomen of a lighter gray than the thorax. Beneath the thorax and abdomen concolorous with the same parts above, the legs ringed with light.

This species is nearest to *Cossus Angrezi* Bailey, but differs from that in several particulars. It lacks the dark shading on the fore wings, in the shape and distinctness of the transverse median line on fore wings, and in the shape and position of the subterminal line. The fore wings are a little less rounded at the apices, otherwise they are shaped alike. The hind wings in this species are reticulated over the terminal two-thirds, while in *Angrezi* the reticulations do not cover quite half. In *Angrezi* the thorax is black, with the edge of the tegulæ shaded with yellowish gray; in this the thorax and tegulae are both gray. The antennæ are pectinated in both sexes, most heavily so in the male. The under side of the wings repeat the markings of the upper side, but a little blurred. The space between the two transverse lines is a little shaded with brownish. The female has the ovipositor exserted about .30 of an inch.

Described from two examples, one of each sex, taken by David Bruce, in Colorado, in 1887, and in the name dedicated to him.

Tolype distincta, nov. spec.

Expanse, male 1.12½, the female 1.50 inches.

Male.—In color and markings between *Velleda* and *Laricis*, rather a dark leaden gray; the fore wings crossed by two geminate lines and a subterminal line, similar to those of *Velleda*, but the subterminal line is also inclined to be geminate. These lines are lighter than the ground colour, but not white as in *Velleda*. The geminate lines bordered each side by a shade line that is slightly brownish; fringes concolorous, a whitish gray line at the base. Hind wings nearly the color of fore wings, a pale shade through the middle and at the outer border; fringe like that on fore wings.

Head and thorax gray, the front a little mixed with brown, the middle of thorax with the usual glossy brown scales in the form of a longitudinal crest; abdomen gray, brown tinted, the sides at the base white, beneath a little paler than above; antennæ strongly pectinate.

Female.—Color and ma[illegible] male, the bands and veins a little more decided in contr[illegible] th the wings. Thorax dark leaden gray, patagiae rather li[illegible] he wings; the entire absence of white anywhere.

This species is between [illegible] *icis* in size, as well as markings and colour. The ante[illegible] ly pectinate, more so than *Laricis*, but not so much a[illegible] ere is no decided white on either sex, except on the si[illegible] men of the male, the cross bands and veins of the fore w[illegible] ish gray. The fringe of the fore wing show a tendency to [illegible] ends of the veins, but they are not pale externally, as are those of *Velleda*.

Captured by Mr. David Bruce, in Colorado, and described from two males in my cabinet, and one female in that of Mr. Bruce.

Halisidota occidentalis, nov. spec.

Expanse, 1.30 inches.

Fore wings hyaline, except the anterior part to subcostal vein, the base, and the posterior part along the submedian vein and a little above that at the base. The costal space alternately four patches of yellow, between a buff and a chrome yellow, and yellowish brown; the posterior margin alternately two spots each of the yellow and brown, the basal yellow and the terminal brown spots the longest. From the costal brown spots three irregular sub-hyaline brown bands extend across the wing, the two outer connecting with the two brown spots on the posterior margin, the third from the outer margin not reaching the margin but blended posteriorly with the second; the sub-basal brown spot on the costa is in line with a red-brown spot on the median vein at base; the subhyaline brown, is darker than that on the costa. The hyaline spaces left between these brown bands corresponds to the light bands in such species as *Agassizii*, etc. Veins brownish yellow, as also the extreme outer portion of the wing. Hind wings hyaline, immaculate; fringes of both wings pale.

Head pale yellowish brown, a yellow transverse stripe in front, antennæ

pectinate, pale yellow-brown. Thorax yellow buff; collar, a dorsal line and a line on outer edge of patagiae brown, the edge of collar next to head yellow; abdomen yellow; beneath pale yellow, with the front of anterior legs brownish.

Described from one male taken by Mr. Bruce, in Colorado.

Halisidota subalpina, nov. spec.

Expanse, 1 55 inches.

Fore wings yellow-buff, so sprinkled with brown scales as to appear quite brown, crossed by six rows of spots that are part yellow and part white, all except the costal surrounded by a brown annulus. The first row is of two spots, the first on costa and the second on median vein, all yellow; the second row is of three, the first large and at right angles to the other two very small white ones; the third row is of five spots, the costal yellow, the next three white, the second very small, the third and fourth equal, the fifth yellow and lacking the basal part of annulus; the fourth row is of five spots, the costal yellow, the second large and in the cell white, the third a brown spot, the other two small, white; the fifth row of six spots all white except the costal, the first and second only separated by the vein, the sixth very small; the sixth row is of nine spots, all white but the costal, the first, second and ninth very small, the seventh and eighth tending to fuse, the ninth removed inward out of line with the others. The last spot in four of these rows is below the submedian vein. Fringes brown, with buff at the ends of the veins. Hind wings pale buff, a pale stain spot at the end of cell and at the apex.

Head yellow in front, brown between the antennæ, antennæ pale yellow brown; collar buff, a central line and a spot each side brown; thorax buff, a brown line each side of the centre; centre of patagiae pale buff, with a brown line each side, the two uniting in front; abdomen buff. Beneath similar to the upper but paler, the abdomen with a central and lateral brownish stripe, the costa of hind wings with three brown stains.

Collected in Colorado by Mr. David Bruce. Described from one male. This species is near *H. Scapularis* Stretch, but differs in size, colour and markings. In *Scapularis* all the spots are white, and the ground color is brown, with the thorax brown instead of buff. These are a few of the differences between the two species.

NOTES ON EREBIA EPIPSODEA, BUTLER.*

Epipsodea was first known to me by examples taken by Mr. T. L. Mead, in Colorado, 1871. He says, in Report of the Wheeler Expedition: "This species inhabits the mountains of Colorado below timber line. Specimens were brought from Fairplay by the Expedition. It begins to appear about the first week in June, is common by the middle of that month, and remains u July."

Several examples were re by Mr. William M. Courtis, from Judith Mountains, Mon 4,000 feet elevation, in July. From Mr. Ernest Stevenson, southeast Washington, came some unusually large specime , 1885; others from Spokane Falls, in east Washington, by lland. I have also received this species from St. Michaels , Alaska; and have received eggs from Mr. Thomas E. Be Alberta. On the other hand, I have not seen *Epipsodea* lorado, or New Mexico, or Arizona, or Utah, nor from th a range anywhere. So far as appears, it is confined to the Rocky Mountains from middle Colorado northward to the Arctic sea, but flies over the lowlands in its northernmost range, and may there have a wide distribution. Many examples from Colorado are small, the wings expanding less than any seen from Alaska; and the largest have come from Washington. Throughout its territory the two principal varieties seem to be found, the banded and not banded.

Mr. Butler described the species from two individuals "from Rocky Mountains," but the locality was not stated.

Mr. Bruce writes: "I first met with *Epipsodea* in Platte Canon, Colorado, at about 9,000 feet elevation. It frequents damp and boggy places where the grass grows rank and coarse. In such situations, up to nearly 12,500 feet, I found it rather common. In one place, at the highest altitude named, a small stream of muddy water from a mine had been conveyed in wooden troughs which emptied into a basin-like depression; in this place, being always moist, the grass and flowers grew luxuriantly, and many species of butterflies were in profusion. *Epipsodea* was plenty, and in almost all the examples I captured here, the ocelli on

*From Edwards's Butt. N. A., Vol. 3, Part IX., issued Feb. 1, 1890. As comparatively few of our readers are likely to see this work, we have thought it worth while to reprint these interesting notes.—Ed. C. E.

upper wings were absent. Many had none on lower wings, others showed black points more or less minute.

"This variety, which Mr. Elwes has called E. Brucei I see, is probably peculiar to these high stations, where I have found it during three seasons, for, in the valley below, there was a narrow, boggy tract, more than a mile long, where *Epipsodea* was plentiful; but I found none of the variety spoken of. The only variation there was marked by the absence of the band on under side hind wings, and this was confined to few individuals.

"*Epipsodea* has a rather quick, jerky flight. It is not very readily captured, for, although it never appears to be in a great hurry, it flies close to the ground, and is always just ahead, dodging under every bush, and around every grassy hummock, as if in earnest search for something. It takes long flights without going far away, and seldom alights on flowers. Directly the sun is obscued, it dives in the grass, like almost all the mountain diurnals. All the Erebias, as well as the alpine species of Chionobas, 'play possum,' and pretend to be lifeless when captured, and will lie in or under the net, or on one's hand, some moments in that condition. I have found *Epipsodea* from June 9th to the end of August, in the front Range, in Colorado; at the latter date it was badly worn."

Mr. Elwes says, Tr. Ent. Soc., Lond., 1889, Part II, p. 334: "I have a single specimen, and Mr. Godman has a similar one, collected by Bruce in Cashier Valley, Summit County, Colorado, at 12,000 feet, which are considered by Bruce and W. H. Edwards to be a variety of *Epipsodea*, though it is so different from it that, had I more specimens, I should be inclined to consider it a different species, more especially as *Epipsodea* does not appear to extend to such great elevations, or to vary much; though its range of altitude is very great. I have taken it in Idaho at about 2,000 feet elevation, and in the Yellowstone Park at 5,000 to 6,000 feet, and have it from Colorado, taken by Bruce, as high as 9,500 feet. The specimens above mentioned are somewhat smaller, and with rounder wings, than the average of *Epipsodea*, but are best marked by the entire absence of ocelli on either wing or on either surface, and the partial disappearance of the red band." In the Synopsis of same paper, page 326, Mr. Elwes puts this under the species name as "? Var. Brucei."

Mr. Bean writes: "At Laggan, *Epipsodea* is moderately common in June and early July, frequenting open, grassy flats of the Bow River valley,

at an altitude of about 5,000 feet. It is, in my experience, rarely found on the mountains, but I took a single male, the past seaon on a mountain ridge, at 7,800 feet, or about 500 feet above the tree line. This specimen does not differ from those of the valley, 3,000 feet below. The form you mention *(Brucei)*, which partly lacks the eye spots, I do not find.

"*Epipsodea* occurred at McLean, altitude 1,900 feet, in 1884, though not so common as it is at La localities were open grassy flats."

The eggs sent me by Mr. F were laid by a female of this var. Brucei, not wholly destitu re being two or three black points on fore wings. The outc le male, true type *Epipsodea*, scarcely banded beneath, out o May, 1888. The eggs were laid 8th July and hatched 20th. re were seven young larvæ. The first one passed first moult econd moult 4th August, the third moult 28th August. The in their stages, but by 15th September, five had passed thi y were at all times kept out of doors, and cool weather now coming on they ceased feeding gradually. On 29th October, I found but three larvæ, all in lethargy, two of the five having disappeared. In November, I took them to Clifton Springs, as before stated. On 5th April, 1888, I received them again, two alive and wide awake as I opened the box. These were at once placed on grass, and in five minutes thereafter were feeding. On 15th April, one passed its fourth moult, the other on 17th. On 30th April, I noticed that one was bringing together leaves of the grass and forming a sort of loose cylinder. It was in the middle of a pretty dense tuft, the leaves of which were three to four inches long. On one of these the larva rested, holding by its prolegs, and was spinning a few threads and drawing the leaves down and about it. Before night the inclosure was complete. Nearly a score of leaves were held, mainly by threads at top and bottom, that is, above and below the larva, making a pretty close covering, but open by spaces so that most of the side, and the head, were exposed to view. The larva rested head up, back arched. Mr. Scudder, in But. N. E., has well characterized this structure as "an imperfect cocoon." Pupation took place on the night of 1st–2d May. Some hours after, when the chrysalis had hardened, I cut away the leaves one by one. There were fifteen of them, and the pupa rested upright, its lower end one and a-half

inch above ground, in an angle formed by three leaves. As I cut one of these, it turned over and fell, showing itself to be unattached. In fact the cremaster was found to be furnished with but straight bristles, very short, and there were no hooks by which attachment could be had. As before stated, a male of the typical form came from this chrysalis on 12th May.

I had received young larvæ of this species from Mr. Bean, at Laggan, 25th July, 1886, they having hatched *en route*. I lost all but one of these. It passed first moult 2d August, the second moult 10th August, and soon after became lethargic. I kept it at Coalburgh, and brought it into the house middle of January, 1887, apparently healthy. But a month later it unaccountably disappeared.

Mr. Bruce had also sent eggs from Colorado which reached me 28th July, 1886. From these, five larvæ reached second moult, and went into hibernation, and died during the winter. From the behavior of the different lots of larvæ, it apears that hibernation may take place at either second or third moult.

This, therefore, is the complete history of an Erebia from egg to imago, and, so far as I know, the first such that has ever been published of one of the genus. To get drawings of the several stages, it was necessary to send them to Mrs. Peart, at Philadelphia, through the mails, some five hundred miles, with risk of loss or damage. Indeed, the second larva was in Philadelphia in its last stage, and being returned to me, imperfectly pupated on the way, and died.

The genus Erebia comprises many species, nearly all of which are European and Asiatic. Dr. Staudinger, in 1871, enumerated forty-eight, many of them boreal, others alpine, the latter found as far to the south as the Pyrenees, Alps, Caucasus, and Himalayas. Great Britain is credited with three species, and, in Buckler's Larvæ of British Butterflies, Vol, I, on. Plate VI, are figured the mature larva and pupa of one of these, E. *Blandina*, and the young larva of another, E. *Cassiope*. In the text, Mr. Buckler relates that he raised the larva of *Blandina* from the egg, obtaining pupa and imago; and a brief description of the several stages is given, that of the larval being imperfect, as nothing is said of the several moults. Nor is it told how the larva pupated. Nevertheless, the plate represents the pupa resting nearly upright on a tuft of grass, but not at all inclosed. It looks very much like the pupa of *Epipsodea*. So an incomplete des-

cription is given of the stages of *Cassiope*, but how pupation took place is not told, nor is there a figure shown. The young larva as figured has forked tails, and therefore, I apprehend, it must have been drawn after the first moult.

In North America, are eight or nine species, three at least of which are said to be old world, namely, *Tyndarus*, *Discoidalis*, and *Disa*. One species heretofore erroneously c rth America, on the authority of Doubleday, E. *Vesagus*, belo des, in South America.

The group is a very interesti ogether with Chionobas, and some others, embraces those i ie Rhopalocera, or Diurnals, which are nearest the Heteroc , allied to them in important characters in each of the four s ne semblances of the larvæ and pupæ are particularly striking are destitute of cremastral hooks in Erebia, in Chionobas, es, and pupation takes place, sometimes on the bare groun or on the sod, in one case, as we have seen, in an impe sometimes in a real cocoon beneath the surface of the ground; or the larva goes into the ground and pupates naked, in a cavity made by the movements of its body, after the manner of nearly all the Sphingidæ.*

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 36, Volume xxii.)

A. placentia A. & S.

1797—A. & S.,* Ins. Ga., II., 129 pl., 65, *Phalaena.*
1816—Hübner, Verzeichniss, 180, *Heraclia.*
1856—Wlk., C. B. Mus., Lep. Het., III., 610, *Arctia.*
1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 529, *Arctia.*
1862—Clem., App. to Morris, Syn. 337, *Arctia.*
1863—Saund., Syn. Can. Arct. 5, *Arctia.*

*NOTE.—Since the foregoing paper was printed, I have seen the CAN. ENT. for December, 1889, and learn therefrom (Vol. XXI., p. 238,) that Dr. H. Skinner has received examples of *Epipsodea*, caught in Assiniboia, about 325 miles west of Winnipeg, and with them one of the var. *Brucei*, mentioned as var. *Sine-ocellata.*

1873—Stretch, Zyg. and Bomb., 74, *Arctia.*
1883—Hulst, Bull. Bkln. Ent. Soc., VI., 70, =*nais.*
1883—Neum., Papilio, III., 150, *an sp. dist.*
Habitat—Georgia, Canada.

A. quadrinotata Strk.

1878—Strk., Proc. Dav. Ac. N. Sci., II., 271, pl. IX., f. 6.
Habitat—Texas.

A. quenselii Geyer.

1830—Geyer, Zutr. No. 424, ff. 847–848, *Arctia.*
1849—Moeschl, Stett. Ent. Zeit. IX., 173, 174, *Euprepia.*
1856—Wlk., C. B. Mus., Lep Het, III., 611, *Arctia.*
1858—Wlk., C. B. Mus., Lep. Het., VII., 1780, *Arctia.*
1860—Clem., Proc. Ac. N. Sci. Phil, XII, 527, *Arctia.*
1862—Morris, Synopsis, 223, *Arctia.*
1864—Gn., Ann. Soc. Ent. Fr. 1864, 4e trim., *Nemeophila.*
1866—Pack., Proc. Bost. Soc. N. H., XI., 34, *Arctia.*
1873—Stretch, Zyg. and Bomb, 74 et 222, pl. IX., f. 8 (♀).
1874—Pack., *Rept. Geol. Surv., 1874, 558, f. 14 (larva).
1887—Smith, Ent Amer., III., 109, *Arctia.*

gelida Moeschl.

1849—Moeschl, Stett. Ent. Zeit., IX., 174. *Euprepia.*
1856—Wlk., C. B. Mus., Lep. Het., III., 611, *Arctia.*
1860—Clem., Proc., Ac. N. Sci. Phil., XII., 528, *Arctia.*
1862—Clem., App. to Morris Syn., 341, *Arctia.*
1873—Stretch, Zyg. and Bomb., 74, *Arctia.*
1873—Streck., Lep. Rhop. et Het., 23, pr. syn.
1883—Moeschl., Stett. Ent. Zeit., XLIV., 116, pr. syn.
1883—Neum., Papilio III, 150, pr. syn.
Habitat—Labrador, White Mts., Col.

A. rectilinea French.

1879—French, CAN. ENT., XI, 45, *Arctia.*
1887—Smith, Ent. Amer., III., 110, *Arctia.*
Habitat—Illinois, New York.

A. remissa Edw.

1888—Edw., Ent. Amer., III., 184, *Arctia.*
Habitat—H. B. Terr.

A. rhoda Butl.

1881—Butler, Ent. Mo. Mag., XVIII., 135, *Arctia.*

Habitat—United States.

This species bears the same relation to *ochreata* Butl. that *decorata* Saund. does to *nais* Dru., and Mr. Butler suggests that it may be the female of either *phalerata* Ha[illegible] Butl.

A. saundersii Grt.

1864—Grt., Proc. Ent. [illegible] I.. 75 et 324, pl. 4, f. 3, ♂, *Arctia.*

1868—Saund., Can. En[illegible] *a.*

1873—Stretch, Zyg. and [illegible] *ctia.*

1881—Butler, Papilio, I.

1883—Hulst, Bull. Bkln. [illegible], 71, *parthenice.*

1883—Neum., Papilio, I [illegible] dist. *parthenice.*

1887—Grt., Ent. Amer., [illegible] *a.*

1887—Grt., Can. Ent., [illegible] dist. *parthenice.*

virguncula ‡ Saund.

1863—Saund., Syn. Can. Arct., 9, *Arctia.*

1864—Grt., Proc. Ent. Soc., Phil., III., 75, pr. syn.

intermedia Stretch.

1873—Stretch, Zyg. and Bomb., 216, pl. IX., f. 3, *Arctia.*

1875—Grt., Can. Ent., VII., 197, pr. syn.

1883—Neum., Papilio, III., 150, an sp. dist.

1887—Smith, Ent. Amer., III., 110, an sp. dist.

Habitat—Can., N. Y., Mass., N. J., Ills.

Mr. Stretch's species *intermedia* is certainly not referable to *saundersii*, but to *stretchii* Grt. and *oithona* Strk.

A. simplicior Butler.

1881—Butl., Ann. and Mag., N. H., ser. 5, VIII., 311, *Arctia.*

"Possibly a well marked variety of *A. achaia*; but apparently intermediate between that species and *A. saundersii.*" So says Mr. Butler.

Habitat—Oregon.

A. snowi Grt.

1875—Grt., Can. Ent., VII., 197, *Arctia.*

1883—Hulst., Bull. Bkln. Ent. Soc., VI., 70, =*nais.*

Habitat—Kansas.

A. shastaensis Behrens.

1889—French, CAN. ENT., XXI., 35, *Arctia.*

1889—French, CAN. ENT., XXI., 162, fig. ♀, *Arctia.*

Habitat—Mt. Shasta District, Cal.

A. speciosa Moeschl.

1865—Moeschl., Wien. Ent. Monatschr, VIII., 195, pl. V., ff. 13–14 *Arctia.*

1866—Pack., Proc. Bost. Soc. N. H., XI., 34, =*quenselii.*

1873—Strk., Lep. Rhop. et Het., I., 23, *Arctia.*

1874—Pack., Rept. Geol. Surv., 1874, 558, *quenselii* var.

1883—Neum., Papilio, III., 150, =*quenselii.*

Habitat—Okak, Labr., White Mts.

(To be continued.)

NOTES ON THE INSECT FAUNA OF HIGH ALTITUDES IN CUSTER COUNTY, COLORADO.

BY T. D. A. COCKERELL, WEST CLIFF, CUSTER CO., COL.

(Continued from page 39, Volume xxii.)

(2) Near Micawber Mine, Aug. 6—

Lysiphlebus salicaphidis Ashm.

Lipolexis chenopodiaphis Ashm.

Limneria montana Cr.

Periclistus sp.

Apanteles sp.

Diaeretus atricornis Ashm.

Megachile sp.

Andrena sp.

Halictus sp.

Sapyga aculeata Cr.

Camponotus vicinus Mayr.

" sp.

Perilampus platygaster Say.

Habrocytus rosæ Ashm.

Passalœcus mandibularis Cr.

Lysitermus coloradensis Ashm.

Aspilota obscuripes Ashm.

Aphidius montanus Ashm.
" *atropetiolatus* Ashm.
Sphecodes dichroa Smith.
Prosapis affinis Smith.
Formica integra Nyl.
Dolichopselphus n. g., n. sp., Ashm.

(3) Near Micawber Mine—
Pteromalus vanessæ F[illegible] from a pupa of *Vanessa*. The larva of *P. vanes*[illegible] mill. long, and is tinged with purplish. The p[illegible] ellow, with the eyes red and very conspicuous.

(4) Timber line and above [illegible]s Park Gulch, Aug. 5—
Bombus ternarius Say.
Habrocytus rosæ Ashm.
Nomia nortoni Cr.
Atractodes sp.

Mr. Ashmead remarks, concerning *H. rosæ*: "I first received this species from Messrs. James Fletcher and Harrington, who reared it from a rose-gall collected in British Columbia." I have reared it from galls of *Rhodites ignota* O. S., and *R. fusiformans* Ckll., n. sp., collected at West Cliff.

(5) Near Micawber Mine, Aug. 4—
Tapinoma sessile Say.
Lipolexis atriventris Ashm.
Habrocytus rosæ Ashm.
Leptacis tetraplasta Ashm.
Psilophrys occidentalis Ashm.

(6) Smith's Park Gulch, Aug. 5—
Calliopsis sp.
Tenthredo occidentalis Cr.
" *ferrugineipes* Cr.
Cremastus sp.
Tapinoma sessile Say.
Bracon sulcifrons Ashm.
Aphidius atropetiolatus Ashm

(7) Micawber Mine, Aug. 7—
Lampronota coloradensis Cr.

Camponotus sp.
Formica sp.
Cremastus sp.
Passalœcus mandibularis Cr.
Figites coloradensis Ashm. ♀.
Apanteles sp.
Aspilota pallidipes Ashm.
Pimpla annulipes Brullé.

(8) Horeshoe Bend, 1887—
Urocerus flavicornis Fl.

Dolichoselphus Ashm., is allied to *Atractodes*, with abnormally lengthened maxillary and labial palpi.

LEPIDOPTERA.

Mr. W. H. Edwards has kindly examined many of the butterflies. The two species of *Cidaria* were identified by the Rev. G. D. Hulst.

(1) Lakes of the Clouds, 1887—
Colias meadii Edw.

(2) Near Micawber Mine, 1888 –
Nathalis iole Bdv.

(3) Near Brush Creek, June 27, 1889—
Phyciodes camillus Edw.
Nisoniades icelus Lintn.?
Argynnis hesperis Edw.
Lycœna sæpiolus Bdv., ♂, ♀.
" *oro* Scudd.

(4) Near Micawber Mine, June 27—
Pyrameis cardui L.
" " form *minor* Ckll., nov.
Anthocharis ausonides Bdv.
Vanessa milbertii var. *subpallida* Ckll.
Pieris oleracea Bdv.
Gnophaela vermiculata Grote.
Agrotis auxiliaris Grote.
Papilio rutulus Bdv.
Colias scudderii Reak.
Lycœna acmon D. and H.

P. cardui f. minor differs from the type only in being much smaller.

A *P. rutulus* was caught at the flowers of *Erysimum asperum* var. *alpestre* v. nov.

(5) Timber line above Smith's Park Gulch, June 27—
Limenitis weidemeyerii Edw.
Chionobas chryxus West. and Hew.
Colias eurytheme Bdv.
C. chryxus was abundant, capture because it flew over exceedingly precipitous and ro

(6) Horseshoe Bend Gulch
Argynnis Edwardsii R
Grapta sp.
Vanessa antiopa L.

(7) Timber line above Sm , Aug.—
Brenthis sp.
Parnassius smintheus D

(8) Smith's Park Gulch, August—
Brenthis sp.
Colias alexandra Edw. ♂.
Chrysophanus helloides Bdv.
Gnophaela vermiculata Grote ♂, ♀.
Limenitis weidemeyerii Edw.

(9) Near Micawber Mine, Aug.—
Gnophaela vermiculata Grote.
Cidara montanata Moesch. (Aug. 15).
" *nubilata* Pack. (Aug. 4).
Pyrameis cardui L.
Vanessa antiopa L.
Parnassius smintheus D. and H.
Limenitis weidemeyerii Edw.
Alucita hexadactyla L.
Grapta sp.
Pieris protodice B. and L., ♂ (Aug. 6).
Chrysophanus helloides Bdv. (abundant).
Nomophila sp.
Botys sp.
Metrocampa margaritata var. *perlata* Guèn. (Aug. 6).
Plusia sp.
Clisiocampa sp.

Colias alexandra Edw., ♂, ♀
Pieris occidentalis Reak. (Aug. 6).
Satyrus charon Edw.
Colias eurytheme var. *pallida* Ckll.
" " var. *keewaydin* Edw. (Aug. 6).
" " var. *eriphyle* Edw. (Aug. 6).

(10) Horshoe Bend Gulch, Aug. 15—
Colias eurytheme Bdv.

ORTHOPTERA.

Ceuthophilus sp., near Micawber Mine.

HEMIPTERA.

The Hemiptera have been identified by Mr. Ashmead.

(1) Smith's Park Gulch, 1889—
Cicada sp.

(2) Timber line above Smith's Park Gulch, Aug. 5—
Nysius californicus Stal.

(3) Smith's Park Gulch, Aug. 5—
Lygus diffusus Uhler.
" *pratensis* L., var.

(4) Near Micawber Mine, Aug. 6—
Podisus bracteatus Fitch.
Nysius angustatus Uhler.
Anthocoris melanocerus Reuter.
Corizus hyalinus Say.
Hadronema militaris Uhler.
" *robusta* Uhler.

(5) Timber line above Smith's Park Gulch, July 27—
Lioderma viridicata Uhler?

(6) Micawber Mine, Aug. 7—
Lygus pratensis L., var.
Idiocerus alternatus Fitch.
Pycnoderes insignis Reuter.

(7) Near Micawber Mine, Aug. 15—
Alydus eurinus Say.

(8) Near Brush Creek, June 27—
Dacota hesperia Uhler.
Lygus pratensis L., var.

DIPTERA.

Tipula sp., Micawber Mine, Aug. 7.

Musca domestica L., near Micawber Mine, Aug. 6.

Culex sp., Lakes of the Clouds, 1887.

Various other species of Diptera, etc., as well as some *Trichoptera*, and species of *Thrips* and ably *plumbeus* L.), and many Aphides, are as yet undete Arachnida are represented by *Epeira* and *Misumena* (pro nd *Phalangodes robusta* Pack. was found near the Micawbe ing the highest altitude known for this species. The Myria sented by species of *Lithobius* *Geophilus* and *Julus*, and m of all, *Polydesmus* was found near the Micawber Mine.

BIBLIOGRAPHY.—The onl rto recorded from 10,000 feet, or above, on the Sangre ge, seem to be *Parnassius*, *Gnophaela*, *Brenthis* and some not very distinct ranges have been explored. Many species are recorded from Veta Pass, and Mr. Scudder has written (Appalachia, 1878) on the insects of Sierra Blanca, and Mr. W. S. Foster has collected Lepidoptera on Marshall Pass.

CORRESPONDENCE.

RARE CAPTURES.

Dear Sir:—When in London last winter, I assisted in naming the private collection of Mr. Rowland Hill, our present young curator. As I was going over his material, my attention was arrested by the unfamiliar look of a few specimens he had secured the season before; they had a resemblance to a familiar enough form—Lachnosterna—but much smaller, and I concluded that I had seen it before. After several ineffectual efforts to secure its name, I sent a specimen to Dr. Hamilton, Allegheny, and he has identified it as *Cyclocephala immaculata* Burm., and remarks that "this species is widely distributed from Ohio to West Mexico, but I never heard of its being taken in the Northern States, east of Northwestern Ohio." I have also been in communication with Prof. Fernald, and I copy the following from his reply:—"No. 2 is *Pædisca nisella* Cl., a European species never before reported in the United States."

J. ALSTON MOFFAT, Hamilton, Ont.

Mailed March 1st.

[redacted]

The Canadian Entomologist.

VOL. XXII. LONDON, APRIL, 1890. No. 4.

ON CERTAIN STATEMENTS IN SCUDDER'S "BUTTERFLIES OF NEW ENGLAND."

BY W. H. EDWARDS, COALBURGH, WEST VA.

As Mr. Scudder has charged me with blunders of one sort or other, I am compelled to notice the matter, as silence on my part would properly be construed as an acknowledgement that he was right.

I. On p. 1805, the synonymy of Argynnis (Brenthis) *Freija* is given, closing thus: "Argynnis *Chariclea* Edw., in his catalogues." And on p. 1808, under *Chariclea:* "Argynnis *Freya* Edw., in his cat."

In the text, p. 1807, we read that "*Freija* is a circumpolar species in the strictest sense, being found on the northern shores of both worlds, and in each extending southward to the habitable zone. * * * In the New World it occurs from Alaska to Labrador, * * * and in the Rocky Mountain region as far south as Lake La Hache and Crow's Nest Pass, west of Fort McLeod. It is said by Edwards to occur in Colorado, but the specimens obtained there by Mr. Mead, to which he probably refers, belong to the next species" *(i. e.* to *Chariclea)*, "while three from Nepigon, referred by him to *Chariclea*, belong here" *(i. e.* to *Freya)*.

On page 1809, under *Chariclea*, we read: "This northern butterfly inhabits circumpolar lands on either side of the Atlantic, but extends much further southward on the western than on the eastern continent, being found * * * not only in Greenland and Labrador, but * * * even (in) Colorado," etc.

Now, although I knew I had not mistaken one of these species for the other, as alleged, I got from Mr. Bruce a pair of the Colorado form, taken by him last summer, and mailed them to Mr. Butler, British Museum, asking which species they were. The reply came two weeks ago, short, sharp and decisive: "Your species is *Freya*; it can by no means be confounded with *Chariclea* * * * It has nothing to do with *Chariclea*."

The Colorado species is *Freya*. The examples taken by Mr. Mead in Colorado, 1871, and of which Mr. Scudder speaks, all passed through my hands, as did the whole catch. I received the butterflies, week by week, through the mails in papers; and, on Mr. Mead's return, we divided the entire lot equally between us. There were many *Freya* (and some of them I have now), but no *Chariclea*: nor has *Chariclea* ever been taken within the limits of the Unite as I know. It flies as far to the south as the Canadian Pa the Rockies; and I not only have examples taken at Lagg , but I have twice had eggs and larvæ from him.*

II. On p. 1863, in the s nphila (Limochores) *Palatka* it is said that Pamphila *Dion* ., XI., 238, is the same thing.

*Mr. Scudder says, page 1807, which he means *Chariclea*: "To judge from the captures north of L a late species, flying late in August and early in September, or at the season, at that place. Evidently winter must be passed, by the cate he egg." I have not learned from Mr. Bean the date of first appears mago, but I received eggs sent by him 4th of August, 1866, and another lot 6th August, same year. Part of each lot hibernated direct from the egg, but part went past third moult and then hibernated. I lost these during the winter. But these last larvæ, had they lived, would have reached imago three or four weeks earlier than the larvæ that hibernated from the egg. This would give the appearance of two broods of the butterfly, and account for some flying in July and others in September.

Under *Chariclea*, p. 1809, by which Mr. Scudder means *Freya*, we read: "Nothing is known of its seasons or history, except that it appears in Colorado early in the season, in May, or early in June, so that winter can certainly not be passed as a caterpillar just from the egg." I have not had eggs of *Freya* from Colorado, but received some from Laggan, sent 6th June, 1886; and again, sent 4th June, 1889. I lost the survivors of the first lot after they had passed the second moult; but those of the last lot (6) reached eight-tenths of an inch in length, and had passed three moults before 2nd July. I thought from their actions they would pupate, but after several alternations of quiet and activity, they finally dropped asleep, and I sent them to Clifton Springs, N. Y., 16th of July, to go in the refrigerating house.

The species *A. Helena* is the representative of *Chariclea* in Colorado, and as that behaves so *Chariclea* might be supposed to behave, if it dwelt in Colorado. Eggs of *Helena*, sent from that State 24th July, 1886, gave larvæ, all of which passed the third moult and then went into hibernation. I lost them during the winter.

I may as well here speak of one other of this group, *A. Triclaris*, found in Colorado and north. I received eggs sent from Laggan, 2nd August, 1889. The larvæ passed second moult and hibernated, and were sent to Clifton Springs 19th September.

The larvæ of all four species are closely like that of *Bellona*. In the first stage, the alternate segments are green and brown, as in *Bellona*, and also *Myrina*. The spines of *Triclaris* are somewhat different from the rest after the first stage, but these others are same as in *Bellona*, so far as I carried the larvæ. Mr. Scudder has tried hard to find characters in the preparatory stages by which to separate the genus Brenthis Scudder (not the coitus Brenthis of Hubner, by a good deal), but wholly without success; and the same is true of the imago. The small species are merely a group of the genus Argynnis. As to two other genera, so called, chipped off from Argynnis, viz., Semnopsyche and Speyeria, there is not a feature in any stage to justify either of them.

Had Mr. Scudder read the two descriptions ever so carelessly he ought not to have made a mistake like this. Also Prof. French pointed out to him the error, and I did the same indirectly through Mr. French. But, nevertheless, he was bound to have his own way. The species *Palatka* was named from a single ♂, 1867, taken at St. Augustine, Fla. In several years this example was an unique. I have it before me now as I write. But in later years *Palatka* has been taken abundantly at Indian River, mostly by Dr. Wittfeld, and is known to all collectors. In the description the expanse is given at 1.7 inch. Omitting all mention of upper side, we come to under side of secondaries, which differs widely from *Dion* in colour and absence of markings, "Under side of secondaries uniform brown, immaculate." *P. Dion* was described in 1879, from the southern shore of Lake Michigan, from Hamilton, Ont., and from Nebraska. It is compared with *Arpa* B. & L. Expands 1.2 inch (that is to *Palatka* as 12 is to 17). "Under side of secondaries ferruginous, of uniform tint, *except that there are two pale rays from base*, one of which passes through cell, the other occupies submedian interspace to margin." These pale rays are a conspicuous feature of this species. *Palatka* is a coffee-brown, solid colour. *Dion* is a red-brown, with two pale bands. On p. 1931, among "Additions and Corrections," are these words: "1715, line 9, the species here referred to as *L. Palatka* is not the *Palatka* of Edwards, but his *Pallas*." I never described a species under the name of *Pallas*. The author has got things in a tangle.

III. On p. 1595, in the excursus "Butterflies as Botanists," we read: "The narrow choice of certain species is, perhaps, indicated in our own fauna of the food plant of Phyciodes *Tharos*. So far as we know it feeds only upon a single species of Aster; 'and if your butterfly selects only that,' said the late Dr. Gray, when I told him of this, 'it is a better botanist than most of us.' Only one other plant has been alleged as its food, and that probably by mistake. This special aster the female selected out of many furnished it by Mr. Mead whereon to lay her eggs, and no one has yet reared it upon anything but aster Novæ Angliæ. * * * Such restriction of choice, if really true, certainly indicates some keen perception on the part of the butterfly." It certainly would.

Mr. Mead, CAN. ENT., VII., 161, 1875, says: "I prepared a box by partly filling it with earth, and transplanting into this small specimens *of all the common Compositæ I could lay my hands upon*, * * * and

about a dozen ♀ ♀, *P. Marcia* and *Tharos*, were introduced. In a few days I examined the leaves and found six patches of eggs upon one of the plants, etc. The plant proved to be a species of aster, * * * from the leaves I think it will prove to be aster Novæ-Angliæ. No eggs were found on any of the other plants." He also says that he afterwards found a brood of young caterpillars upon a plant of this aster in a meadow.

In CAN. ENT. IX. 1, 187 t I was in the Catskills with Mr. Mead when he made tioned discovery, and that I afterwards got eggs for mysel emale butterfly over the stems of A. Novæ-Angliæ, and br e while young to Coalburgh. "On the journey, stopping a , I had to give them leaves of such species of aster as I co ey ate any and all readily— even German Asters from th en I related how I repeatedly got eggs of *Tharos* in same urgh, W. Va., (where A. N.-Angliæ does not grow). I that *Tharos* will feed on any other plants than asters, but the y sort of aster surely.

IV. On p. 1926: "Mr. Edwards tells me that Mrs. Peart observed one case (of *G. Interrogationis)* in which the final egg of a chain had eleven ribs, when all the others had nine. Could a second female have *possibly* placed an egg upon a chain laid by another!?" I did not know what the author meant to imply by the italicised word and the note of surprise. The observation as to this chain of eggs is mentioned in Part VIII., Vol. 3, Butt. N. A., in the paper on *Interrogationis*, as follows: "I had supposed the number of ribs in all eggs laid by one female was the same, but Mrs. Peart found that, in a string I sent her, the topmost egg had eleven ribs, while all the rest had but nine, as shown on the plate, fig. a^4." The eggs were laid by a single female in confinement, and were put in alcohol and so sent Mrs. Peart. It occurred to me to ask Dr. C. S. Minot, an authority in biology, if he could explain how this could have been, and he replied: "The eggs of insects descend from the ovarian tubes into the so-called uterus, where they lie for some time, and have the shell formed by the secretions of the uterine walls. These walls are thrown into folds, which are characteristic of the genera and species, and the egg shell, so far as its outer pattern is concerned, is a cast, so to speak, of the folds in question. It seems to be quite possible that the number of folds (and therefore the number of ribs on the shell) should vary in different

parts of the uterus. But I doubt if there are any observations on that point at present." That seems a reasonable explanation.

V. *Argynnis Atlantis*, p. 578. It is said: "The early history of this species is almost wholly unknown, the different stages of the caterpillar and the chrysalis never having been adequately described." I had this species from the egg, and described every stage, egg, larva and chrysalis, in CAN. ENT., XX., p. 1., 1888, in the manner usual with me; and as Mr. Scudder has copied my descriptions of other species by wholesale, I am at a loss to see what there is "inadequate" in this of *Atlantis*, or why it is dismissed so curtly.

VI. *Colias Eurytheme*, p. 1126. Under the division of *Eurytheme-Eriphyle* comes the species *Harfordii* H. Edw., and its var. or co-form *Barbara*, and reference is made to the description and life history of same, with plate, in Butt. N. A., V., 3. I showed in the paper cited that the male *Harfordii* comes near *C. Interior* Scudder, a species which the discoverer regards as genuine; and that the var. (or co-form) *Barbara* approaches the *Eurytheme* group, *i. e. Eurytheme* and *Philodice*, and I said, "So that the species in certain points resembles species belonging to two distinct sub-groups." Dr. Hagen, Trans. Bost. Soc. N. H., 22, 165, 1883, judged *Harfordii* to be neither more nor less than *Interior*. Mr. Scudder might have compared the genitalia, as he believes in those organs as tests of species, and told us wherein *Harfordii* resembles *Eurytheme*.

VII. *Limenitis Disippus*, called Basilarchia *Archippus*. There is so much in this life history that is at variance with what I myself have observed in West Virginia, that one would seem to be dealing with a distinct species, and that the New England form could not be the same as the Virginian.

Page 261. The protection of the egg from "ants, mites and spiders * * * is undoubtedly in the fewness of their number on one plant. The spider that finds two eggs of a Basilarchia in one day must be an excellent hunter." In this region there is no limit to the number of eggs that may be laid on one tree. The seedling plants of aspen are often full of eggs or larvæ. On one occasion I found four larvæ on four leaves of one little stem; on another I found eleven eggs and young larvæ on a plant not over eighteen inches high, nearly one to every leaf; on another I found nine eggs on a small tree. I once discovered a female oviposit-

ing on a willow of some ten feet high. She laid in my sight at least six on different parts of the tree, and I brought away two of them, the rest I was unable to reach.

I asked Prof. Rowley, at Curryville, Mo., what was his experience in this matter, he says: "I watched a female *Disippus* last August laying eggs on aspen. She flitted here and there, and in the course of about fifteen minutes had laid a d[illegible] was busy when I inadvertently frightened her away. Once [illegible]eturned to the same twig. In searching for cases of this sp[illegible] Year's day (1889), I examined but two plants of willow; t[illegible]y four feet high, yielded twelve cases; the other, less than t[illegible]ve me forty-five. In one case, two were found on one twig. [illegible]ches apart, on another three. I have seen five larvæ on [illegible]rout of aspen; seven eggs on another. Once found two [illegible] one leaf, both on perches, one at the end, the other at the [illegible]

Page 273. "On hatching [illegible]ats the apical leaves, and then those next in order, omitting none in its passage down the stem, so that, as Lintner says, its position may be 'at once revealed by the twig upon which it had fed * * * being entirely defoliated from its tip about eighteen inches downward, leaving only the footstalks remaining.'" The fact is that the larva makes its case of the leaf it was hatched on, though, for cause, it will move to another in order to make the case. As to stripping a stem, even the mature larva does not do that to any such extent as is intimated above that the young larva does. It is at all stages a light feeder.

Page 277. "It is a curious thing that we find in the caterpillars of the first brood, no tendency whatever to construct hibernacula; here we have an instinct inherited by alternate generations." On page 1416, speaking of the same caterpillar: (it is) "the caterpillar of the latest brood which constructs a hibernaculum * * *; yet, with this common butterfly, no instance has been given where a caterpillar of an earlier brood showed the remotest tendency towards such action." Now, Mr. Scudder may be right for New England, where *Disippus* is said to be two-brooded only, but in West Virginia the caterpillars of the brood before the last (there being three annual broods) often make hibernacula, and some of the same lot will do this, while others go on to pupa and imago. If this fact has never been recorded before, I put it on record now. Some

of a lot of larvæ also will make their cases after second moult, others after third and in the following spring. Some, but not all, of those which hibernated after second moult, will pass three more moults. There would seem no reason why some larvæ of the first of the three Virginia broods should not make cases, as some of the second (in mid-summer) do. And certainly we could not say positively that they do not; nor do I see how one could say positively that some of the first New England brood do not make cases. The evidence against it is negative only. I have found that caterpillars and butterflies are apt to do just what we would think they could not. I never knew of a larva hibernating after first moult, as it is stated that they "not at all infrequently" do, on page 275; nor do I think the small larvæ, after that moult, would have the physical ability to cut out and weave together a case.

A RAINY DAY ON THE MOUNTAINS.

BY DAVID BRUCE, BROCKPORT, N. Y.

There is a tradition extant in Denver that the sun shines in Colorado nearly every day. This last summer was a woeful exception, however, for, from the middle of April until the end of June, the weather would have been thought respectable only in Labrador, but the unusual wet and cold spring, although it retarded the insects, gave such an impetus to the growth of flowers and herbage on the mountain sides and tops, that, when the hot weather set in, all species of diurnals appeared to be unusually abundant, and every kind seemed to be flying at one time. I had collected for some time with indifferent success during this wet season in the foothills and lower canons, and I made up my mind, despite the weather, to try the higher ranges. So I climbed above timber line one showery afternoon the beginning of June, and spent the night in the same shanty I had occupied on my visit in 1887; the proprietors, two honest miners, welcomed me heartily. The next morning was gloomy, cold mists rolled up from the valley and white clouds collected round the peaks, but I donned a pair of miner's overalls and went out determined to do something. In a drizzle that seemed as much snow as rain, I climbed the sloping sides of Mount Bullion, which was covered more thickly with

vegetation than I had ever seen it before, owing to the frequent rain. I had not searched long before I found several full grown larvæ of *Parnassiuss Smintheus* on Sedum. This was a fair beginning, as I had for several years searched unsuccessfully for this larva. A pretty Arctian larva was also feeding on the same plant (from this I bred *Arctia cervinoides* Strecker). I commenced overturning the smaller rocks, and was soon rewarded by finc larvæ and pupæ, also many small Noctuids. Attached larger rocks I found several pupæ of butterflies; these] few days *Melitæa anicia* and *Argynnis Helena*. Under i in crevices were many species of *Agrotis*, sometimes from individuals crowded together. The ants were swarming t the rocks, and they, with the predaceous beetles had des ls, as was evidenced by the mutilated wings and empty I o fascinated with my occupation that I forgot all abou After I had filled all my tins and boxes and got very h d my way to the cabin again, quiet satisfied and surprised with the morning's work. From the larvæ and pupæ obtained I bred :—

Arctia cervinoides Strecker, five specimens.

Arctia Brucei H. Edw., three specimens.

Arctia sp. (?), one specimen.

A grey *Bombyx*, allied to *Dasychira*, from a tufted pupa enclosed in a cocoon like *Halesidota* but thinner, this came out next day in the box, and I didn't see it until it was spoilt and could not recognize it.

Apatela, two, allied to *Felina*, but larger and darker.

Plusia Hochenworthi, several.

Agrotiphila Montana, six, the pupa and imago were common under rocks.

Agrotis ochrogaster, four, imagines abundant and variable.

Agrotis, several specimens not yet determined.

Hadena lateritia, one.

Anarta melanopa, common, both pupæ and moths.

On sheltered sides of rocks were several *Glaucopteryx magnoliata*, or a species very like it, and one *G. phocataria*. Larvæ and pupæ of *Melitæa anicia* were not uncommon. *Argynnis Helena*, one pupa, also one of *Pieris calyce*.

The elevation of my hunting ground was about 13,000 feet.

THE NOCTUIDÆ OF EUROPE AND NORTH AMERICA COMPARED.

(Sixth Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Tribe *Stiriini.*

This tribe is, so far as I know, exclusively American. The thorax is elevated, the patagia usually deflected. The eyes are naked; the front embossed; the legs thinly scaled, with a claw on front tibiæ; the abdomen somewhat short and weak, untufted on dorsum; the wings pointed at tips. The genera seem to fall in between *Calpe* and *Plusia.** They are: *Basilodes, Stiria, Stibadium, Fala, Plagiomimicus, Acopa.* The genus *Cirrhophanus* probably belongs to the *Heliothini;* we do not know the larva, but the moth is allied to *Chariclea delphinii*, by the Hübnerian character of the pattern of ornamentation. It is probable, also, that *Chamaeclea* is best placed among the Heliothians.

Polenta, referred here by me (CAN. ENT., XV., 75), based upon an erroneous identification of Mr. Morrison's *Tepperi*, with my *Plag. Richi*, may be related to one of the species figured by Hübner in the "Zutraege," under *Schinia*. I saw the type, but was not able to examine it for generic characters. It seemed to me to be a faded example of a southern form of *Plagiomimicus*, which I possessed, narrower than *Pityochromus*, of a delicate olive green, with a frontal cup-like excavation and a claw on the fore tibiæ. Mr. Smith assures us that *Tepperi* has the fore tibiæ unarmed; consequently, I described my species as *P. Richi.* Finally, Mr. Smith's *Cerathosia* may belong here. This moth has the false appearance of a *Psecadia*. I have shown that it is not a micro, neither is it an Arctian, "next to *Utetheisa*," as stated by Mr. Smith. It has a globose thorax; a frontal horn, thinly scaled legs with a claw on front tibiæ. The shape

*In reference to the question of rank in the Lepidoptera and to a former paper of mine in these pages, I would state that, while from morphological grounds, we must consider the four-footed butterflies as the highest, the sequence *within* the family must be decided on comparative grounds. It may be that the *Satyrinæ* are the lowest subfamily group of the *Nymphalidæ*, but they must be nevertheless classed with the family. The characters by which the butterflies approach the moths are apparent in all the groups; as might be expected if we consider the moths to represent an older phase of the Lepidoptera. The highest *Nymphalidæ* must be sought for in the tropics; but it may be, that the sequence in our North American fauna is to be inaugurated by the Hackberry butterflies.

of the wings is not unlike *Acopa*. The secondaries are 8-veined: vein 5 weaker; costal vein 3-branched; 7 to tip; 7 and 6 a rather short furcation; 8 thrown off from the upper margin of 7 near the base. The frontal horn is impressed on the face. The moth was evidently classed "next to *Utetheisa*," upon Hübnerian characters: the paler, spotted and narrower primaries the bright [illegible] nd wings. A superficial resemblance to *Emydia* and [illegible] us given. *Utetheisa* has a smooth front and unarmed tib [illegible] næ, with two stronger bristles on each joint. *Cerathosia* h[illegible] s otherwise distinct from the Lithosians, while the curious [illegible] f the generic title *(thosia?)* would seem to be a fragment [illegible] *lithos*. The discovery of the larvæ of *Cerathosia* will prob[illegible] itional light upon the affinities of the insect. In the mean ti[illegible] point out that, in its generic characters, this form coinci[illegible] articulars with the Noctuidæ belonging to this tribe, as also [illegible] *ini* in its scaly vestiture.

Tribe *Plusiini*.

The thorax is rather short and square, but globose above, with hairy, somewhat silky covering, which forms, posteriorly, an abrupt tuft. The eyes are naked, lashed in *Plusia*, unlashed in *Telesilla*. The wings are somewhat pointed with full external margins. The tibiæ are unarmed. The ornamentation of *Plusia* is remarkable for the silvery or golden middle marks, or sheeny patches. The American species are forty-two in number, exceeding the European thirty-eight; but, probably more remain to be described with us. We have representatives species, i. e. *Putnami*, allied to the European *festucæ*, while *parilis* is found in Lapland and Labrador. The question whether *ni* can be separated from our *brassicæ*, I have been inclined to answer negatively. The peculiar abdominal tufts speak for the identity of the forms. Among American forms are a greater number of gray and brown species, allied to *gutta*, *interrogationis*, *chalcytes*, etc., and are, perhaps on the whole, less showy. Nevertheless, a resemblance may be traced between many species, as between *V-argenteum* and *Mappa*, *Zosimi* and *balluca*, etc. The resemblance is further shown in the species of *Habrostola*, which have the caterpillar 16-footed and the moths without metallic marks, while *Plusia* has 12-footed larvæ. But the most remarkable among the American species of *Plusia* are the three mimetic forms: *thyatiroides* which resembles a

Thyatira, formosa which resembles a *Leptina* and *striatella* which resembles a *Heliophila (Leucania). Behrensia* is a Californian type, allied to *Habrostola;* and *Deva*, an eastern and western genus, as closely allied to *Plusia.*

Tribe *Heliothini.*

The body is untufted, the abdomen rather short, the eyes (except in *Anarta)* naked, sometimes narrowed, the tibiæ usually armed, the antennæ brush-like. The activity of the species, and several of their characters, suggest a resemblance to the *Agrotini;* so that I have thought of them as flower-haunting Agrotidians, whose bright colors are due to their changed habits and the gay tints of their floral homes. How the colors of the larva may come to resemble those of the plant on which it feeds, how the tints of the moth may copy the corolla in which it hides, has been shown by Prof. Kellicott in the case of *Rhodophora florida.* Several of the European genera are represented in North America by identical or related species. In particular is this the case with the species of Hübner's genus *Heliothis.* As might be expected, the flowery western plains afford a large number of species; while, in Europe, there are some forty species belonging to about thirteen genera, in America we have over 110 species belonging to about thirty-five genera. The species of *Heliothis* seem identical with the European; whether they have been imported with plants (which seems less likely), or are unchanged survivals, I cannot decide. No variety of *armiger* like var. *umbrosus*, which is longer, more of a pale olivaceous, and not dirty ochrey like the type, and which I have taken in Southern cotton fields, seems to be known in Europe. My *Pyrrhia angulata* and *P. stilla* are, beyond any question, distinct from the European *P. umbra.* The pink and yellow *Rhodophora* and *Rhodosea* are peculiar to America; the extraordinary genus *Heliochilus* is said to occur likewise in Aisa. The shiny white genera *Euleucyptera* and *Tricopis* are peculiarly American. I regard *Nyctophaeata (Epinyctis)* as a Heliothian, notwithstanding certain coincidences, mostly in outline, with the *Cucullíini*, or again in armature with *Cleophana.* The European genus *Xanthodes* appears to belong here, and we seem to have a representative species in the Texan *X. buxea,* but I have not been able to compare the moths. The white coloured genera *Antaplaga, Grotella, Triocnemis*, prepare us for the following tribe. Our beautiful western species, *T. saporis*, has a resemblance to the European *Euterpia laudeti.*

Tribe *Tarachini.*

The thorax is squamose, being covered with flattened scales. The legs and wings are also covered with oppressed scales; while the form is, on the whole, like the preceding type. Whether more than the genus *Tarache (Acontia)* and *Chamyris* belong here, I am doubtful—*Trichotarache* having a resemblance to the Heliothians, to which *Xanthodes* and *Trileuca* may also belong. *Tarache* has its metropolis in Africa. We have some tw s, while Europe has but six. The species bear a general re ach other from the prevailing white colour, to which *terminim* s a singular exception. Our most beautiful species, with a r to the exquisite moth *Ciris Wilsoni*, is, perhaps, *Tarache l* rvey.

Tr *i.*

The moths are small, with l primaries, which have usually somewhat of a tortriciform cut, r daries, the squamation on the body thin, mixed scales and hair. s are naked, antennæ simple, the form is frail. Boisduval calls these insects "*Noctuophalenidæ.*" The caterpillars are 12 or 14-footed. The typical genus ***Eustrotia (Erastria)*** has nine European and thirteen American species. The European genus *Thalpochares*, with twenty-six European species, is but sparingly represented with us. I have been able only to study the neuration of *aetheria*, which is an undoubted *Thalpochares.* In this group I have found the neuration useful in separating the genera. From neurational characters I have separated the American forms, related to the European genus *Agrophila*, under *Spragueia.* I have also referred here, under the generic name *Euherrichia*, certain American forms with silvery marks, previously referred to *Eriopus.* The peculiar Californian genus *Annaphila*, with fourteen species curiously resembling miniature *Brephinæ*, I refer also here. Among interesting American genera are *Exyra*, which is parasitic on *Sarracenia*, the pitcher plants; *Escaria*, a western form, and *Azenia* with large clypeal projection. This tribe, although represented by some of the principal European genera, offers many peculiar American forms, such as *Tripudia*, *Gyros* and *Fruva.* The departure from the European types is perceivable. Consult for the neuration of *Thalpochares* and *Eustrotia* Grote, N. Am. Ent., I., p. 46–47. Also, for the structure of *Erotyla*, *Spragueia*, *Fruva*, *Xanthoptera* and *Exyra*, CAN. ENT., XI., pp. 231–238. For *Euherrichia*, New Check List, 1882, p. 64, (sub. *Herrichia).*

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 55, Volume xxii.)

A. stretchii Grt.

1875—Grt., CAN. ENT., VII., 197, *Arctia.*
1883—Neum., Papilio, III., 150, =*intermedia.*
1886—Grt., CAN. ENT., XVIII., 110, an var *intermedia?*
Habitat—Texas.

There is no doubt but that Mr. Neumoegen's reference of this species to *intermedia* is correct.

A. superba Stretch.

1873—Stretch, Zyg. and Bomb., 227, pl. 9, f. 12, *Arctia.*
1887—Smith, Ent. Amer., III.; 111, *Arctia.*
Habitat—Vancouver.

A. virgo Linn.

1758—Linn, Syst. Nat., I., 501 (ed x.), *Bombyx.*
1764—Clck.*, Icones, pl. 45, f. 5, *Phalaena.*
1764—Linn, Mus. L. U., 311, *Bombyx.*
1767—Linn, Syst. Nat. (ed. xii.), 820, *Bombyx.*
1775—Fabr., Syst. Ent., 582, *Bombyx.*
1781—Fabr., Spec. Ins., II., 199, *Bombyx.*
1787—Fabr., Mant. Ins., II., 129, *Bombyx.*
1791—Oliv., Ent. Meth., V., 93, *Bombyx.*
1793—Fabr., Ent. Syst., II., 1, 472, *Bombyx.*
1793—Gmel., ed. Linn. Syst. Nat., 2419, *Bombyx.*
1797—Sm. and Abb., Ins. Ga., II., 123, pl. 62, *Phalaena.*
1816—Hübner, Verzeichniss, 180, *Euplagia.*
1823—Hübner, Samml. Ex. Schmett. II., pl. 402, *Euplagia.*
1837—Harris, Cat. Ins. Mass., 73, *Arctia.*
1841—Harris*, Rept. Ins., Mass, 244, *Arctia.*
1856—Wlk., C. B. Mus., Lep. Het., III., 608, *Arctia.*
1858—Duncan, Nat. Libr., XXXII., 175, pl. 19, f. 3, *Spilosoma.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 528, *Arctia.*
1862—Clem., App. to Morris Syn., 338, *Arctia.*
1862—Harris*, Ins. Inj. to Veg., ed. Flint, 345, *Arctia.*

1863—Saund., Syn. Can. Arct., 6, *Arctia.*
1864—Grt., Proc. Ent. Soc., Phil., III., 325, pl. 4, f. 4, ♂, *Arctia.*
1873—Stretch*, Zyg. and Bomb., 74, 126, pl. 6, ff. 1, 2.
1876—Moeschl., Stett. Ent. Zeit., XXXVII., 296, *Arctia.*
1878—Graef., Bull. Bkln. Ent. Soc., I., 4, var. of.
1878—Schaupp*, Bull. Bkln. Ent. Soc., I., 59.
1881—Graef, Bull. Bl[illegible]., 58, *Arctia.*
1883—Hulst, Bull. Bl[illegible]., 70, *Arctia.*
1887—Smith, Ent. An[illegible]*rctia.*
var. *parthenice*
1837—Kirby, Fn. Bor[illegible]94, *Callimorpha.*
1862—Clem., App. to [illegible]9, *pr. var.*
1863—Saund.*, Proc. [illegible] II., 28, *Arctia.*
1863—Saund.*, Syn. C[illegible]*rctia.*
1864—Pack., Proc. E[illegible]II., 116, *Arctia.*
1864—Grt., Proc. Ent[illegible]., 325, =*virgo.*
1879—Beth., CAN. ENT., XI., 153, *Arctia.*
1883—Hulst, Bull. Bkln. Ent. Soc., VI., 71, =*saundersiana.*
1883—Neum., Papilio, III., 149, =aberr. *virgo.*
1887—Grt., CAN. ENT., XIX, 31, =*virgo.*
1887—Smith, Ent. Amer., III., 110, =*saundersii.*
Habitat—Can. to Ga., west to Iowa, Mo., Ills., Mich.
An omnivorous feeder, according to records and statements.

A. virguncula Kirby.
1837—Kirby, Fn. Bor. Am., IV., 304, pl. 4, f. 6, *Callimorpha.*
1856—Wlk., C. B. Mus. Lep. Het., III., 609, *Arctia.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 528, *Arctia.*
1862—Clem., App. to Morris Syn., 338, *Arctia.*
1873—Stretch, Zyg. and Bomb., 74, 218, pl. 9, f. 5, *Arctia.*
1879—Beth., CAN. ENT., XI, 153, *Arctia.*
1881—Coquillet*, Papilio, I., 7, *Arctia.*
1887—Smith, Ent. Amer., III., 109, *Arctia.*
nais ‡ Saund.
1863—Saund., Syn. Can. Arct., 9, *Arctia.*
1864—Pack., Proc. Ent. Soc., Phil., III., 117, pr. syn.
Habitat—Can.. Me., N. Y., N. J., Ills.
Recorded as feeding on *Polygonum aviculare.*

A. williamsii Dodge.

1871—Dodge, CAN. ENT., III., 167, f. 34, *Arctia.*

1873—Stretch, Zyg. and Bomb., 74, *Arctia.*

Habitat—Colorado.

(To be continued.)

CORRECTION OF AN ERROR.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Mr. H. J. Elwes has recently published a paper in Trans. Ent. Soc., London, 1889, p. 535, entitled "A Revision of the Genus Argynnis," and on page 574 writes as follows :—"I have also specimens of *Arge* Strecker, from Strecker and Mr. Holland, both from Spokane Falls and California, which are, undoubtedly, the same as *Erinna*, which was described in 1883 as a var. of *Eurynome* by Edwards, and in his catalogue of 1884 is put down as a variety of *Montivaga*. If, therefore, he is himself so uncertain of the true position of these forms, he cannot expect others to follow him blindly," etc. On reading this I looked at the catalogue referred to, and sure enough, on p. 30, *Erinna* is set down as a var. of *Montivaga*. How this happened I cannot say, but I suppose by an error of the printer, which was overlooked in correcting the proof. I see the same mistake occurred in the list which closed Vol. 2, Butt. N. A., also dated 1884; but as the list was copied from the catalogue, that is understood. *Erinna* was rightly described by me in 1883 as a var. of *Eurynome*, which, to my mind, it undoubtedly is. Part of my collection is now in possession of Dr. Holland, including *Eurynome* and its vars., and I wrote him to please look at the *Erinna* specimens and tell me what the labels say. I have his reply as follows :—"All the specimens bearing that name are classified in your collection under *Eurynome*, according to your original description. The labels read:

A. Eurynome.
var. *Erinna* Edw.
Type. Spokane Falls."

I therefore suggest that persons using my catalogue should note the correction, and transfer *Erinna* to *Eurynome* on page 29, following *Arge*. Str.

APPENDIX TO THE NOTES ON INSECT FAUNA OF HIGH ALTITUDES.

BY T. D. A. COCKERELL, WEST CLIFF, CUSTER CO., COLORADO.

Alpine Orthoptera.

Mr. L. Bruner has kindly identified the following Orthoptera, found at 10,000 feet and upwards:

Circotettix undulatus Th ... wber Mine, Aug. 6.

Ceuthophilus maculatus ... r Micawber Mine.

Pezotettix dodgei Thos., ... mber line above Brush Creek, about 12,000 feet, Aug. 5.

Gomphocerus carpenterii ... locality and date as *P. dodgei*.

Al... era.

The Rev. G. D. Hulst ha... ied the following Lepidoptera, from 10,000 feet and upward... , Colo., additional to my previous list:—

Acidalia Californiata Pack., near M... wber Mine, Aug. 6.

Cidaria designata Hübn., Micawber Mine.

Botis plumbosignalis Fernald., near Micawber Mine, Aug. 6.

Euceratia? georgiella Hulst., near Micawber Mine, Aug. 6.

There are a few misprints in my paper, viz.:—P. 39, line 15 from top, for Welsh read Walsh; p. 39, line 16 from top, for pickly read prickly; p. 56, line 9 from top, for *vanessa* read *vanessæ;* p. 57, line 9 from top, for Horeshoe read Horseshoe; p. 57, line 10 from top, for Fl. read Fb.; p. 59, line 7 from top, for Horshoe read Horseshoe.

NOTES.

THE TACHINID PARASITE OF CIMBEX AMERICANA.—Mr. L. Bruner, in the report of the Entomologist, Nebraska State Board of Agriculture, for 1888, has an interesting article on that notable pest *Cimbex Americana* Leach, in which he states that although the insect is abundant in Nebraska, he has failed to find that it has any parasite. Last year, however, I obtained a larva of *C. Americana* on willow by Short Creek, Custer Co., Colorado, which produced the puparium of a Tachinid parasite. In "Insect Life," 1889, p. 164, we learn that Mr. Lugger has also found a Tachinid parasite of the *Cimbex* in Minnesota, presumably the same species as the Colorado one. It will be curious if it turns out that the parasite is confined to high latitudes and altitudes, while its host is more widely spread. T. D. A. COCKERELL, West Cliff, Custer Co., Colorado.

BOOK NOTICES.

THE CAVE FAUNA OF NORTH AMERICA, with remarks on the Anatomy of the Brain and Origin of the Blind Species. By A. S. Packard, M. D. Vol. IV: First Memoir—National Academy of Sciences. 4 to., pp. 156.

The author of this admirable volume is everywhere known throughout the scientific world from his numerous works, especially on Entomology, and has obtained a deservedly high reputation in Europe as well as in America. This reputation will, we are confident, be, if possible, enhanced by the elaborate monograph before us. It contains many original observations of cave animals, some careful scientific investigations, and a very interesting chapter of philosophic considerations. It is also fully illustrated by a map of the Mammoth Cave in Kentucky, a number of wood cuts and a series of twenty-seven beautiful lithographs, nearly all of them drawn by the author himself. The work begins with a description of the Mammoth Cave and others in the neighbourhood, and gives lists of the various animals found within them; an account of the Wyandotte and other caves in Indiana, Clinton's Cave in Utah, and one in Colorado; a discussion of the geological age of the caves and their inhabitants, the mode of colonization and the source of their food-supply. The second chapter describes the vegetable life of the caves, which is naturally of the most meagre description. Then follows a systematic description and list of the invertebrate animals found in North American caves, among which spiders are the most numerous. Insects are represented by eight species of Thysanura, four of Orthoptera, two of Platyptera, ten of Coleoptera and nine of Diptera—a by no means extensive list, but one that includes some very curious and interesting forms. The beetles of the genus *Anophthalmus* are especially remarkable and attractive to the ordinary entomologist. Lists are also given of the European and North American cave animals, and of the blind, eyeless creatures which do not live in caves, and which, strange to say, almost equal in number their cavernous relatives. The next chapter gives a careful account of the anatomy of the brain and eyes (when partly developed) of certain blind Arthropods. The chief interest of the work culminates in the final chapter where the author discusses the origin of the cave species as bearing upon the theory of evolution. We have not space for any abstract of his views, which are well-deserving of study, but must refer the reader who desires fresh evidence on the subject of evolution to the work itself.

We entirely agree with the author in his closing words: "In the case of too many naturalists the dogma or creed of natural selection has tied their hands, obscured their vision, and prevented their seeking by observation and experiment to discover, so far as human intelligence can do so, the tangible, genuine, efficient factors of organic evolution."

AMERICAN SPIDERS AND THEIR SPINNING WORK. A natural history of the Orbweaving Spider[illegible] States, with special regard to their Industry and Hal[illegible] C. McCook, D. D. Vol. I. Published by the Auth[illegible] Natural Sciences of Philadelphia, 1889. 4 to., pp[illegible]

The author of this sumptu[illegible] is so well known from his valuable and interesting work[illegible] history of various kinds of Ants, and his charming little l[illegible] "enants of an old Farm," that any productions of his pen are[illegible] rd to with lively anticipation and keen interest. We are qui[illegible] no one of the subscribers to this, his latest and greatest wo[illegible] n in the least degree disappointed by this first volume of t[illegible] l three. Though spiders are not insects, we have no doubt that every entomologist, and indeed every lover of natural history in any of its departments, will deeply enjoy the perusal of this volume. We cannot give a better idea of its contents than by mentioning the subjects treated of. They are, first, the general classification, structure and spinning organs of spiders; the construction and armature of Orbweavers' snares; the characteristic forms and varieties of snares; unbeaded orbs and spring snares; the engineering and mechanical skill and intelligence of spiders; their modes of procuring food and habits in feeding; their fangs and poison bags; their modes of nest making and its development in various tribes; and finally the "genesis of snares." All these different subjects are fully illustrated with more than three hundred and fifty wood cuts. The second volume is to treat of the mating and maternal instincts, the life of the young, the distribution of species, etc.; and the third will be devoted to descriptions of the orb weaving fauna of the United States, with coloured illustrations of a number of species. The whole will form one of the most complete works of the kind in the English language. Entomologists will need to have long purses if they wish to possess all the literature of the day, and to procure for themselves such costly and beautiful books as Scudder's and Edwards's Butterflies and McCook's Spiders. We trust that all who can possibly afford it will aid the authors in their self-sacrificing enterprises by subscribing for their books, but those who cannot do so should us-

their influence with their local Scientific Societies and Public Libraries and induce those in charge to purchase these valuable works for the general benefit. We are glad to say that the Public Library in Toronto and our Entomological Society have set a good example in this respect and rendered these works available for many of our readers.

ENTOMOLOGICAL NEWS and Proceedings of the Entomological Section of the Academy of Natural Sciences of Philadelphia. Vol. I., Nos. 1-3.; January March, 1890.

We gladly welcome another addition to the serial publications on North American Entomology. There is plenty of room for this new monthly Magazine, as it takes charge of a field which we and others have been unable to cultivate fully. It is intended to bring before students and workers the news and gossip of the day gleaned from all quarters of the globe ; the contents of current literature ; abstracts of the proceedings of Societies, etc We hope that the new venture will have the fullest measure of success, and enjoy a career of long continued prosperity and usefulness.

REPORT ON INSECT AND FUNGUS PESTS. No. 1. By Henry Tryon, Assistant Curator of the Queensland Museum. Published by the Department of Agriculture, Brisbane, Australia, 1889. 1 Vol., 8 vo., pp. 238.

We have perused with great interest this first work that we have seen on the Economic Entomology of Australia. Some of the pests referred to are very familiar to us here, for instance, the Codling Moth and the Woolly Aphis of the apple tree, while others are species closely allied to those which are very destructive with us. The report takes up the different fruits, vegetables and field crops that are most commonly cultivated in the colony, and describes the insects which especially attack them ; as far as possible the life history of each pest is given and remedies are suggested. The work is very carefully and thoroughly done, and will, no doubt, be of great value to the fruit-growers and farmers in that part of the world. Its usefulness would of course be greatly enhanced by illustrations of the insects treated of, but evidently there were difficulties in the way of procuring these that could not at first be overcome. Future Reports will doubtless be made more popular in this way. The author deserves much credit for the valuable book he has produced. We trust that the Queensland Government will give him all the assistance and encouragement possible in the prosecution of his studies in practical entomology, and enable him to continue a work that is of the utmost economic importance.

CORRESPONDENCE.

RARE CAPTURES.

Dear Sir: In my letter with this heading in the March number, p. 60, there is an omission of a word which quite alters my meaning. Line 6 of my letter should read, "I concluded that I had *not* seen it before." I took *Pædisca nise* ıt the same time, last August, about twenty miles north of H County of Halton. I found it sitting on the trunks of smal ılar trees.

MOFFAT, Hamilton, Ont.

GRAPTA INTERR MONTREAL.

Dear Sir: I was some to see the capture of the above species at Montreal r ing an unusual and almost unknown occurrence (Feb. nu ɔ). In Mr. Caulfield's list, CAN. ENT., VII., 87, *Interroga* "Rare; May (hibernated); July to October," and I have always considered it one of those species which are neither rare nor abundant. The first specimen I have any record of was taken by me in Mr. Trenholme's garden, Rosemount Ave., Cote St. Antoine, on Sept. 7th, 1886. In the fall of 1887 it was abundant at Mr. Trenholme's, and a number of specimens (all *Fabricii)* were taken; between that time and the present I know of about 40 other specimens being captured in various parts of the town, and I succeeded in rearing three separate lots of larvæ to imago during last fall, all feeding on elm leaves. The form "*umbrosa*" seems to be much rarer here than *Fabricii*, but a few have been taken by Mr. P. M. Dawson and other collectors. I saw a single specimen of *Interrogationis* at St. Rose, P. Q., July 6th, 1889, but was unable to catch it.

ALBERT F. WINN, Montreal, P. Q.

ERRATA.—The following corrections should be made in Dr. Hamilton's paper on "Balaninus" in the January number:—Page 1, line 23, and elsewhere, for "*proboscoideus*" read "*proboscideus*." Page 5, line 33, for "nostrum" read "rostrum" Page 6, line 34, for "three first" read "first three."

Mailed April 7th.

The Canadian Entomologist.

VOL. XXII. LONDON, MAY, 1890. No. 5.

NOTES ON "A REVISION OF THE GENUS ARGYNNIS," BY HENRY J. ELWES, F. L. S., F. Z. S., ETC.

BY W. H. EDWARDS, COALBURGH, WEST VA.

So much of the text of Mr. Elwes' paper as relates to North American species has recently been printed in Psyche (March), but the synonymic list, which is most important for a full comprehension of the state of mind of the author, was omitted. I applied to the editor of the CAN. ENT. to print this list, but it was found that it would occupy nearly one-half the space of a number, and it was not thought expedient to give it. In course of the present paper, however, enough of said list will be given to show the features of the whole. Mr. Elwes, in "revising," as he terms it, has cut the forty-two species enumerated in Group I., in my Catalogue of 1884, adding *Cipris* and *Semiramis*, described later, to fifteen; and in Group II., makes one of *Bellona* and *Epithore*. He says, page 560, (Psyche, 308): "The Argynnides of North America are, without exception, the most difficult butterflies to classify that I have studied. I have a collection which includes authentically named specimens of almost all the species and varieties, many of them direct from such well known collectors as Messrs. H. Edwards and Morrison, many from Messrs. Strecker and Geddes. I have also seen some of the best collections in the United States." * * * "It seems presumptive for a man to set aside much of what has been written by those who have seen, both living and dead, so many more specimens than I have seen, etc."

Undoubtedly it is a difficult group, and Messrs. H. Edwards and Scudder, with myself, have studied it long, but do not pretend to know completely some of the forms; and it seems odd that a stranger can skip from ocean to ocean and back again, stop here a day and there a week to ply his net, visiting a few collections, and those mostly second or third rate, getting his specimens "authentically named," in nearly all cases by

persons who never saw several of the described species, or have their knowledge at second hand, and on the strength of this pronounce judicially on the American Argynnides! One of my correspondents, a lepidopterist, not a mere collector, on reading the paper in Psyche, wrote me thus: "It is an amazing piece of presumption for a visitor to America to collect and buy a lot of specimens and on the strength of that to denounce and try to overthrow [illegible]irself and Scudder, who have been studying the butterflies [illegible]quarter of a century, and must know a thousand times more [illegible]an he possibly can." And another correspondent, of sar[illegible]ys: "I think it a pity for a man to write on such a subjec[illegible] throw some light on it."

Mr. Elwes gives the impr[illegible]ad studied the important collections of the country, but [illegible]mine, nor that of Mr. Bruce (rich in the Colorado specie[illegible] the American Entomological Society in Philadelphia, nor [illegible]on the Atlantic slope except Dr. Holland's, Mr. Neumoeg[illegible], [illegible] Edwards's and Mr. Strecker's. On the Pacific, those that he could have seen were local and small. It is known that I have sold my collection to Dr. Holland, but at the time Mr. Elwes visited Pittsburgh, the greater part of the rarer and less known Argynnides, and particularly those that have so perplexed this gentleman, had not been delivered. At Mr. Neumoegen's he scarcely glanced at the group, but gave all his time to the East Indian butterflies. He says himself that he "went through" Mr. Edwards' collection, but, as Mr. Edwards has not returned from Australia, I cannot learn at what pace, though I can imagine it. But he spent considerable time at Reading, and Mr. Strecker tells his friends that "he took copious notes," and that he "gave him many points." The paper shows as much.

I had cordially invited Mr. Elwes to visit me and inspect the Argynnides, but not finding himself able to come, he failed to see the most complete collection in the group treated of ever brought together, containing not only the types of all the species I had described, but every one of Dr. Boisduval's types of Californian species: in other words, of nearly every species described since 1852. Of the two species described by Mr. H. Edwards, and the four by Dr. Behr, I have examples named by them, and in most cases long suites, with all the varieties which during thirty years I had been able to bring together.

I could have shown Mr. Elwes the points of difference in difficult sub-groups, and could have named all his specimens "authentically." But he preferred to take counsel of this and that "collector," with the plain result that his specimens are not named "authentically," and that his collection must be a hopeless jumble. It is clear as can be from his list that in half the cases he does not know what he is talking of. For example: "*A. Aphrodite*, *A. Cybele*, *A. Alcestis*, *A. Cipris*, *A. Halcyone*. This is a group of species or forms which are extremely hard to define; and though Edwards and Scudder, and most other North American Entomologists, agree in keeping them separate, I think it is very difficult, if not impossible, to identify them, unless you know their habitat." (One would think that such cases were unheard of elsewhere. Habitat is an important aid in determining between closely allied species, and zoologists in every branch, and botanists, take it into consideration.) I have a pretty good series of all, except *Cipris*, which must be very close to, if not identical with *Alcestis*, etc." Plainly, he does not know *Cipris* then, a species closer to *Aphrodite* than to *Alcestis*. "Either such experienced collectors as Morrison or Geddes did not know *Aphrodite* when they saw it out of its usual range, or *Scudder and Edwards are mistaken*." Truly, it does look so. However, it is not remarkable that the collectors named did not distinguish *Cipris*, inasmuch as, in their day of collecting, it had not been separated. "Mr. Edwards perhaps would say that my *Halcyone*, which were sent by Mr. Strecker, and taken near Denver, are not true to name; but what can they be from that locality?" Here it seems that locality helps him to decide on a species. "What can they be?" I can answer this pathetic appeal: *Halcyone* is not "taken near Denver," but *Cipris* is, and Mr. Elwes was viewing a *Cipris* undoubtedly. Now *Halcyone* does not belong to the *Aphrodite* sub-group, as anyone can see by the figure of the female in Butt. N. A., vol. 3, part IX. It has the peculiar cut of wings of *Edwardsii*, and great egg-shaped silver spots. So, here are two species our author is at fault about.

And he is bothered with *Chitone*, "sent by H. Edwards from Nevada," which "does not agree with W. H. Edwards' description on the under side" (which is the important side), "and is nearer *Nevadensis*." He never saw *Chitone*, a species not taken in Nevada, but in Southern Utah and in Weber Mountains, and totally different on both sides from *Nevadensis*.

A *Lais* "seems to me very near *Atlantis*"; and in the list, p. 546, he says "*Lais (Atlantis* var.?)," not being able to determine whether it is a species or a var. He never, in text or list, refers to the plate of *Lais*, in Butt. N. A., vol. 3, which, as well as the description, testifies to a species that cannot be confounded with *Atlantis*.

"There occur, however, in Nevada, forms which are described as *Laura* and *Macaria*, of whi ntic specimens from Mr. H. Edwards, and which, by thei eem to be *Coronis*." Then, in same connection, speaking before quoted, he goes on: "None of these names can, i be retained, except as synonymns, though they are *all k* dwards' Catalogue as distinct species." On this I remark Edwards is one of the few experienced lepidopterists w quainted with the American Argynnides. He collected fo as in California and Nevada, and knows more of the livin an any other one man. In doubtful cases I rely on his j all persons. His collection does not embrace, by a good deal, all the described species; but, so far as it goes, it is complete, and each species is represented in long suites. This collection was undoubtedly the most important one Mr. Elwes visited. "In going through Mr. Edwards' collection, I noted *Columbia* as similar to *Hesperis*;" and on the strength of that casual glance one May morning, down goes *Hesperis* as *Atlantis* pure and simple, and *Columbia* as well but with a query, the usual confession of ignorance of its position. It takes something more than "going through" a collection in this fashion to make one's self acquainted with forty species, and giving the right to pronounce on them. In the present case, also, some deference might be thought due to Mr. Edwards' standing and experience. But, I doubt very much whether Mr. Elwes saw *Macaria*. So far as I know, it is not Nevadan, but is confined to the Greenhorn Mountains and Kern River region in South California.

"Whether *Montivaga* and its var. *Egleis* are really distinct from *Eurynome* and its varieties, is hard to say," p. 574. Who said *Egleis* was a var. of *Montivaga?* I am confident the author of this paper never saw *Montivaga*, unless under another name. It is neither *Egleis* nor *Eurynome*, but the same as *Arge* Strecker, which last is not *Erinna* at all, as anyone can see by reading the two descriptions. Mr. Mead, who has a keen eye for resemblances or differences, (alas, that he has gone over to the

botanists !) on his return from the summer's collecting in California and Nevada, 1878, went to Reading, and at once identified *Arge* as *Montivaga*, many examples of which he had taken at Tallac, Nevada. The description supports Mr. Mead's testimony. *Erinna* was unknown till five years after *Arge* was described, when the first examples were brought in from Washington Territory. Neither it nor *Eurynome* are Californian. In Butt. N. A., Vol. II., *Eurynome* is figured and its egg: in Vol. III., *Egleis* and its egg. Apart from the sufficient distinctness of the imagos, the different form of the eggs is decisive, though doubtless Mr. Elwes does not know it. There is no appreciable variation in the shape of the eggs of any species of Argynnis. Mr. Scudder relies implicitly upon this fact, even in the characterization of genera. If one is higher than broad, with a given number of ribs, all are ; if one is broader than high, all are. The egg of *Eurynome* is squat, as broad as high, with twenty ribs ; *Egleis* is tall, considerably higher than broad, with eighteen ribs. I may say here that nowhere in the paper do I find the least reference to the plates in Butt. N. A., except on page 574. When talking of *Bischoffii* and *Opis*, I read : " In Edwards' figures I can see no specific characters." In the list most of the plates are referred to, but in the text no one would suppose that any of these species had been figured, or that such figures as are given were of the least use in determining species. The author prefers to trust to his " authentically named " specimens.

On p. 536, he says he has not *Inornata* in his collection, and indirectly that he never saw it, but he " cannot recognize it as a species." Nothing further is said of it, but in the list it is put under *Callippe*, " ? var. vel trans. ad *Edwardsii*, vel ad *Zerene*, *Inornata*." *Edwardsii* in no one character resembles *Zerene*, and is Coloradan, while *Inornata* is found only in California. The plate shows it to be one of the most distinct species of the fauna. The male is as red as *Adiante*. *Callippe* has no red about it, but is dark and melanic. So that here *Inornata* is put down as related to three wholly unrelated species, under one of them, and *on its way*, " trans." to the other two !

A. Hippolyta, which is kept up " (a favorite and charming phrase !) " by its author as a species, and seems to be something intermediate between *Hesperis* and some form of *Zerene* " (all roads lead to *Zerene* !) " Its locality would indicate that it may be nearer to them than to *Atlantis*." (Observe the admission that habitat is worthy of considera-

tion!) But, in the list, p. 547, *Bremnerii* is put as a true species and *Hippolyta* as a synonymn of it—not even credited as a var.! It strikes me there is discrepancy between text and list. And *Rhodope*, also one of the most distinct species in the fauna, is put under *Bremnerii*, to which it has no relation, as "? var. *Rhodope*." The "authentically named" specimens have misled the author, and, as usual, the plate would have set him right.

"The species allied to nely, *Zerene* and *Bremnerii*, have puzzled me quite as mu , Strecker and others. In *the damper climate* of Oregon rker form, *Bremnerii*, occurs, * * * and might be con Pacific coast form of *Atlantis*, but in the specimens taken the silver is absent, and these might well be considered a darker form of *Zerene*." A characteristic sample of this iews of species! In the first place, I will say, that Edwar has not been puzzled by the species in question. In the t *Bremnerii* is not at all like *Atlantis*. In the third place, I had long suites of the Mt. Hood specimens from Morrison, receiving by pre-contract every variety and every species taken, and no *Bremnerii* was without silver. Nor in the many examples I have seen from Oregon and Vancouver, have I seen one that was not as fully silvered as *Cybele*. In the fourth place, Mr. Elwes has never seen a *Bremnerii* without silver. Doubtless, he is talking of *Zerene*. And in the last place, notwithstanding all his bewilderment and error of determination, he actually puts in the list *Monticola*, *Bremnerii* and *Zerene*, as three of his fifteen true species!

A. Behrensii is put under *Monticola* as "? var.," with this funny comment: "? trans. ad *Monticola*, vel. ad *Bremnerii*, nomen vix conservandum." Now, *Behrensii* resembles neither; it is one of the rarest of our species so far, and in all these years I have seen but four examples of it. I do not believe the author ever saw one. Here again the plates could have enlightened him.

So much for ignorance. There is another class of species, differing radically in colour, size, form, and in the shape and number of the silver spots, which, to our author's eye, look all alike. "*A. Leto* is a species which, though undoubtedly nearly allied to *Cybele*, is fully as distinct from it as *Nokomis*, and may be regarded as its Pacific Coast form in the

same way as *Nokomis* is the form (i. e. of *Cybele)* of the dry central plateau of the continent." He had already said that *Cybele* and *Aphrodite*, and several others, were all one species, and now gets into the same corral *Leto*, *Nokomis* and *Nitocris*, which last, he says, is nothing but a form of *Nokomis*. And he quotes the wise remarks of his friend and counsellor, Strecker, with approval: "I have always contended that *Nokomis* was a pale abnormal form of *Cybele*, of which we have so many other instances in other species, (I should like to see a statement of these other instances!) from the *dry salt regions* of Utah and Arizona," p. 568. Pity that Mr. Darwin had not lighted on that explanation of the origin of species! The dry salt air changes the form of a species, changes its coloration throughout, changes the form of the silver spots, enlarges or decreases their number, lines the spots with heavy bars of black on both anterior and posterior sides. Thus a *Nokomis* is manufactured out of a *Cybele!* *Leto* is as unlike *Cybele* in shape, in the silver spots, their size and number, and in the colour of both sexes, as it is unlike *Zerene*. *Nokomis* female, on the upper side, is of the same pattern as female *Diana*, the spots being yellow, which in *Diana* are blue. *Leto* female, in place of the extra-discal oblong spots on hind wings, seen in the other two species, has a solid yellow band. To me it seems absurd to the last degree to be talking about the identity or even the nearness of the three species to each other. I happen to have bred *Leto* from egg to imago, and the larva has striking differences from that of *Cybele*. And how any one can look at the plates of *Nokomis* and *Nitocris*, and call them forms of one species, is past my understanding.

A. Semiramis "*to my eye* is nothing more than a form of *Coronis*, in which the black markings of the upper side have become paler and more reduced, *as might be expected* from the arid character of the country where it is found. It has been taken by Mr. Wright in the mountains separating the San Bernardino Valley from the Mohave Desert, and was not out when I visited these mountains in May, 1888." Why might it have been expected? That strikes me as on a par with the reason given for transformation of species in Utah, the dry salt air; and in Oregon, the damp climate. As it happens, the region where *Semiramis* is found is not on the desert side of the mountains, and Mr. Wright, in answer to my inquiry, denies the arid character, and says that no mountains are dry

there. " The winds all the year are from the Pacific ; the desert is 20 miles away, across 5,500 feet of a mountain range."

"*A. Adiante* is a form which both Strecker and Edwards consider distinct. On the coast of Calif., according to Strecker's information, it is now extinct, and all the male specimens *(I have seen no females)* in Mr. Godman's and my collectio- taken many years ago. I should certainly be inclined as a variety of one of these species," *i. e. Zerene* or *M* he opinions held twenty-five years ago, when Dr. Behr w ollector, are not conclusive." In the list, under the true *e*, is set : "*? Hydaspe* Bdvl.; *? Irene* Bdvl.; *? Rupestris te* Bdvl." Now *Hydaspe* is really a var. of *Zerene.* I h types of both. *Rupestris* is in no way related to *Zerene*, se cases the author is unable to pronounce definitely. H v, confessedly, what they are ; nor whether *Adiante* is a va e text, he says he thinks it is a var. of either *Zerene* or ll, which ? Knowing nothing at all, he puts it as a ? var. of *Zerene.* Perhaps if one could cut down the wings of *Zerene* or *Monticola*, trim the edges a little, change the hue of the upper side, reduce to streaks all the heavy black markings or obliterate half of them, wipe out all the marks and spots of the under side, one could manufacture an *Adiante* that would seem the real article to the reviser of the Argynnides. For myself I am content with the species as nature made it. But this is the process by which 42 species are cut down to 15.

I could have shown Mr. Elwes recent specimens of *Adiante* of both sexes, and told him where to seek it. In 1889, a correspondent obtained eggs of it for me.

In the list, p. 545, we have under the head of true species *Aphrodite* Fabr.; "? var. *Alcestis : Cipris*" (put as a mere synonymn of *Alcestis)*, "*? Aphrodite* Mead" (which is neither more nor less than what, thirteen years after Mead's mention, was separated as *Cipris.)* But the gem of the group is put thus : " var. vel bona sp. *Nausicaa* Edw." It is either a var. or a good species, the author does not know which, but all the same it stands under *Aphrodite*, and another species is disposed of. If the author knows nothing, why not say nothing !

List, p. 541, " *Bellona* Fab.; var. *Epithore* Bdvl.; the fore-wings less

produced apically, the hind margin convex (in *Bellona* it is concave or sinuous), the base less obscured, beneath paler." If these characters are not enough on which to found a species, or separate two species, how much further must we look? But in addition there are other separating characters.

What are we to think of a transient visitor on the strength of his desultory experience "going through" such collections as he had access to, pencil in hand and carpet bag in the hall, and of his "authentically named" specimens from "experienced collectors," making a list after this fashion? Confessing at every step that he is lost, groping his way by query marks, uncertain whether to call a thing a var. or a good species; but, all the same, putting each incomprehensible form under something else. He laments his trouble, but can't approve of Edwards' way of getting over the difficulty (Elwes' difficulty) by creating other species, p. 566. Everywhere trans. ad *Zerene*, vel *Edwardsii*, vel *Monticola*, vel *Behrensii*, vel *Callippe*, vel *Meadii*, one species half the time trans. to at least two others. The result of this floundering is a paper and list on the lines of, and level with, Strecker's Catalogue! With a difference, however, in favor of Mr. Strecker: that no matter how ignorant he is, he never allows it, but is cock sure that *Cybele* and *Leto* and *Nokomis* are but the same thing; and Colias *Eriphyle*, *Philodice* and *Eurytheme;* and Satyrus *Nephele*, *Ariane*, *Boopis*, *Gabbii*, *Alope*, *Pegala*, *Wheeleri*, all one (vide Cat.). We do not find him dealing in query marks or alternatives. Such assurance is at least refreshing in contrast with the painful uncertainty and confusion of this paper.

Indefinite knowledge is definite ignorance, but when one is in the latter state, why take the world into his confidence?

I suppose, before Darwin, all naturalists were perforce lumpers of species. Each species was a little world with its group of satellites. But, since 1861, the view is changed, and in this country lumpers are nearly as scarce as dodos.

I myself am the reverse of a lumper in my method of work, and as I have always avowed the fact, my position is well understood. "I apprehend," says Prof. Owen, "that few naturalists nowadays, in describing and proposing a name for what they call 'a new species,' use that term to signify what was meant by it twenty or thirty years ago. * * * * The proposer

of the new species now intends to state no more than he actually knows; as, for example, that the differences on which he founds the specific character are constant in individuals of both sexes, so far as observation has reached," etc. That is what I act on, and I believe the lepidopterists of this country do the same, as a body. In CAN. ENT., 21, 235, 1889, Mr. Lyman says: "I hold very strongly that whenever a form is distinctly and easily separable named species, it is entitled to be treated as a good speci ven a specific name, until it is proved to be only a variet etc.

Dr. Holland writes, after wes' paper: "Your course in applying specific names to pparently constant, varieties, is proper, no doubt. The s may be relegated at a later time to the rank of a mere v nce has been the gainer by the process." Professor Riv t paper in Psyche, holds the same view. So does Mr. Gr heck List.

In illustration of the two ing: In 1876, I described a certain yellow Colias from British Columbia as *C. Eriphyle*, being satisfied that it could not be *Philodice*, the then only described yellow species of the sub-group. In 1883, I named another yellow Colias from Colorado, that seemed to have distinct features, as *C. Hagenii*. Year after year I endeavored to get eggs of the Colorado form, and when at last I succeeded, the butterflies resulting showed that that *Hagenii* and *Eriphyle* were essentially the same thing, and both were a yellow form of the orange species *Eurytheme*.

Per contra, as an example of lumping without knowledge, quite after Mr. Elwes' own heart: Mr. Strecker, in his Catalogue, puts *Philodice* as a species, and *Eriphyle* as a variety of it—not only that, but *Occidentalis* and *Chrysomelas* as well, though these belong to a different sub-group from *Philodice*. Which was the more reasonable proceeding, to lump as varieties or synonymns several forms of which the lumper knew nothing, or to spot them as separate, and go to work to ascertain the facts?

In the same way I had separated the two orange Colias, *Ariadne* and *Keewaydin*, as species, and when the opportunity came for breeding them, they were proved to be polymorphic forms of *Eurytheme*. So two of the polymorphic forms of Papilio *Ajax* were reckoned, not only by me, but by Dr. Felder, as distinct species, till breeding showed them forms merely, but deserving a name of course. By naming and separating a probable

species, attention is directed to it, it can never more be lost sight of, and sooner or later its true position will become established. But if several forms, of which nothing definite is known, are rolled into a lump, who can say that they will ever again be separated or even noticed!

In Mr. Elwes' revision of the genus Erebia he enumerated *Epipsodea*, and hesitatingly under it (with a query) a var. he thought worthy of a name, *Brucei*. He says he did not know whether to call this a var. or a species. He and Mr. Godman had each one specimen, and "it is so different from *Epipsodea that, had I more specimens*, I should be inclined to consider it a different species." So he puts it down as a var. with a query. If he had had more specimens—say one or two more—he would have done exactly what he is holding Mr. Edwards up to public reprobation for, put it as a species! Well, Mr. Bruce sent me eggs laid by the *Brucei*, and in due time one of them gave a typical *Epipsodea* imago. The indefinite knowledge has become definite.

On p. 569, larval characters are deprecated as a means of determining doubtful species, because the larvæ "are liable to vary" as much as the perfect insect. I will put my experience against the author's, and I say that the variation in the larvæ of each species of Argynnis is practically nothing.* They are as like each other as so many peas. When, therefore, I have reason to think, from the imago, that a certain form is a distinct species, as, for example, the one now known as *A. Cipris*, and which was called by Mr. Mead and myself the Rocky Mountain form of *Aphrodite*, but on my part always with doubts, if I can get eggs, I may find out the truth one way or the other. In case of *Cipris*, the larva and pupa showed a distinct species, and thereafter I had no difficulty in defining the geographical limits of *Cipris*. *Aphrodite* has a chocolate-brown larva and brown pupa, with no other markings; *Cipris* has both stages variegated and striped with yellow, and is as remarkable in its ornamentation

*There are many cases among the Heterocera, where the larvæ alone are relied on for distinguishing species, vide Weismann's Theory, p. 543, Eng. Ed. "In the Sphingidæ, cases are not wanting in which the moths are far more closely allied than the larvæ. This is especially striking in the genus Deilephila, eight species of which are allied in the imaginal state, in a remarkable degree, whilst the larvæ differ greatly from one another in color, and to as great an extent in marking." In the case of *D. Euphorbiæ* and *Niceea*, whilst the larvæ show great differences * * * the moths *cannot be distinguished with certainty*. The imago of the rare *Niceea* is, for this reason, wanting in most collections; it cannot be detected whether a specimen is genuine, i. e., whether it may not perhaps be a somewhat large example of *Euphorbiæ*."

as *Idalia*. Suppose I had followed the example of the lumpers and *Cipris* had been overlooked altogether! What gain would have accrued?

I will lay down another rule that is infallible in Argynnis. Each species has its own style of silver spots, and there is practically no variation throughout the species, or in the range of it. *Coronis* Behr. abounds in South California, flies in all the intervening States to Montana, and in Oregon and Washington, ar ch in coloration of both surfaces as any American speci where we may, the great egg-shaped spots are always the not follow, though, that every specimen with egg-shaped s a *Coronis*. *Cybele* always has silver spots of its own ty o, so *Nokomis*. In no case does one of these species ap . In *Macaria* the spots are at their maximum, in *Chiton* um ; yet, in the list, both are put down as vars. of one o I would commend a careful course of study in these poin of the paper.

Mr. Elwes is sure that M will one day regret" having "in his earlier years created a great number of synonymns." I am sorry that he should be pained on my account. I am as much of a sinner in my later years as in my earlier, and have within a week described two species of Argynnis, which Mr. Elwes will regard as either "vars. or bona sp., or trans. ad *Zerene*." "His later views, as expressed in such papers as he has written on *P. Napi* and its vars., and in Lyc. *Pseudargiolus*, give evidence of a correct appreciation of the variation of species," for which condescending and patronizing approval I am duly grateful. But the illustration of L. *Pseudargiolus* is not so pat as was intended. I named both L. *Violacea* and *Neglecta* as species, and figured them as such in Vol I., Butt. But, when eggs were got, the whole curious and complicated relationship was made out, and these forms and several others were proven to be polymorphic forms of the one species *Pseudargiolus*. And I will venture to say I proceeded scientifically from first to last.

With regard to *P. Napi*, all I attempted to do was to show how a parent species could originate distinct derivative forms, and though I called all *Napi*, yet the derivatives, every one of them, are good and true species, or dimorphic forms of species, breeding true, not intermixing, and in the next edition of my Catalogue I shall put them down as such. I think I can see how the derivation from a single form occurred, but the derivatives are now species, and at present entirely separated from the parent *Napi*.

Anyone who has collected, and studied, and bred butterflies for years will have ideas as to the limits of variation in each species, and he will judge forms newly presented to him by those which he already knows. The eastern Argynnids—seven species—show little variation except in size, and it is only *Cybele* and *Aphrodite* that show that, according as they are northern or southern. The others are remarkably constant. Neither of these species, whatever its variation, runs into another, or approaches another. No one but a novice can possibly mistake one for another. Judging by what I see of them, I do not expect to find much variation in the genus elsewhere, and in fact if there are any variable species in our fauna, they form the exception, not the rule. The greater part are certainly as well defined as *Aphrodite* and *Atlantis*. I believe all the 42 described species, unless perhaps *Clio*, to be good species, constant to type, breeding true. *Clio* may turn out by breeding to be a dimorphic form of *Eurynome*. I should be delighted to be the means of proving it, but till it is proven, I hold it as separate. As to *Artonis*, that it is distinct from *Eurynome* and *Clio* I have no doubt whatever. I know it is found abundantly where *Eurynome* does not fly, and of course it breeds to its own type.

On page 535, in this remarkable statement, when speaking of the Argynnides of all the world: "The difficulties in this genus are not so great as in Colias and Erebia, *except in the species* inhabiting the Rocky Mountains and Pacific States of North America, which run into each other in a most extraordinary manner. Most of the European species, though closely allied, are fairly distinct, and I have *only marked one species out of America as doubtful.*" So far as relates to all the world, then, except these western districts of America, the rule I laid down holds good by Mr. Elwes' own admission, that the several species of Argynnis vary only within certain limits, and nowhere run into each other.

Mr. Elwes had only to make sure of his American species, which he could easily have done by seeing the original types, and he would have found his rule held good universally. But ignorant of the types, he started wrong, and trusting to what he calls authentically named specimens, received from experienced collectors, together with his lack of knowledge of the preparatory stages, or of what are the most important features of the imagos, he has landed where we find him.

THE BUTTERFLIES OF LAGGAN, N. W. T.; ACCOUNT OF CERTAIN SPECIES INHABITING THE ROCKY MOUNTAINS IN LATITUDE 51° 25′.

BY THOMAS E. BEAN, LAGGAN, ALBERTA.

THE LOCALITY.—Laggan is a telegraph station of the Canadian Pacific Railway, 956 miles g as the railway runs, and six miles east of the British n boundary. A mile west of Laggan the railway leaves 'alley, and turns more directly west into the valley of No(;ross the central range of the Rocky Mountains, the sum being six miles from Laggan. Directly east of Laggan, Pi flowing from the north, joins the Bow; its sources are iles to the north, among the crags of the Sawback Rang les distant from the headwaters of the Red Deer River. A west of Laggan, Noore's Creek enters the Bow: this strean ely ten miles long, carries, on warm days, a great volume of water, derived from an extensive snow field on the eastern face of the Waputtehk Range. The Bow River itself, rising about latitude 51° 45′, flows southeast for a long distance in an elevated shallow valley parallel to the axis line of the Rocky Mountains, and close to the basal slope of the central range of peaks. At Laggan, the surface of the river, at its ordinary summer level, is but three hundred feet below the elevation of the summit of Kicking Horse Pass.

The entomological ground, whose butterflies I propose to speak of, is chiefly a limited district immediately around Laggan, comprising, on the east, the valley of the Bow to a distance of four miles, and on the west the same valley for two miles; embracing on the southwest the valley of Noore's Creek, and the summit valley of Kicking Horse Pass to a point about three miles west of the British Columbia boundary; and extending on the north from the level of the Bow to the peaks of the nearest of the "Slate Mountains." A less complete examination has been made for nineteen miles east along the railway, and above timber line upon mountains at Stephen and Hector; also between the Bow River and Emerald Lake, three miles south.

As regards continental position, Laggan is about one hundred and sixty-five miles north of the international boundary, on a line with the western boundary of Montana, in the same longitude as the Great Slave

Lake and the peninsula of Lower California. It is approximately in latitude 51° 26′ north, and its elevation above the sea is recorded as 5,005 feet, only 290 feet less than that of the railway summit at the head of Kicking Horse Pass, while it is nearly a thousand feet higher than Morley, at the edge of the mountain district, and over three thousand feet more exalted than Regina, in the region of the central prairies.

To aid an estimate of the climatal and zoological conditions of the Laggan district, certain facts may be mentioned, partly of a general nature and partly local. The latitude of Laggan brings it about in line with the Aleutian Islands, Moose Fort on James Bay, and York Point, Labrador, while it is almost two degrees more northerly than Anticosti Island, and about four and a-half degrees further north than the city of Quebec. The district is thus seen to be considerably more northern in position than any other equally accessible North American entomological field which has been as fully examined. This district is on the warmer side of the continent. Although so much further north than Mount Marcy in the Adirondacks, on which timber line occurs at 4,850 feet, and the White Mountains of New Hampshire with timber line at 4,250 feet, yet the mountains about Laggan lift their forests to a far greater altitude, the uppermost fringe of larches illuminating timber line in September with a soft yellow glow at a height of 7,000 feet. The difference in the climate of western British America from that of the eastern side is illustrated by the occurrence of rattlesnakes at the "Forks of the Red Deer River," in the warm plains east of the mountains; the locality is nearly due east from Laggan, and is in the latitude of Southern Labrador.

The *local* conditions of the Laggan district, however, are distinctly of a boreal tendency. So great is the altitude of the Bow Valley that the railway grade is but 2,000 feet below timber line; in the vicinity of Pike's Peak, Colorado, an equal relative position would be met with at an altitude of 9,700 feet. The valley of the Bow, indeed, is but a comparatively narrow pass, parting two great systems of chaotic upland, where peak is frozen to peak by an almost unbroken line of glaciers—every sunless height a field of snow, each shaded alpine abyss a gulf of ice. As may well be supposed, these frigid environments powerfully affect the summer climate of the region, and exert a controlling influence upon the night atmosphere even when the days are warmest.

Among the noteworthy features of the scenery may be mentioned:

Mount Hector, in the northwest; Mount Temple, about eight miles southwest, with a great field of snow and ice on its summit a mile above the valley; Mount Lefroy, seven miles to the south, and the glacier of Noore's Creek, nine or ten miles west; also Emerald Lake, three miles south of the Bow, and the various rapids and canons of the Bow and Pipestone.

For names and figure[illegible] I am indebted chiefly to the "Geological Survey of Can[illegible]nett's Dictionary of Altitudes."

Preliminary to a cons[illegible] the Laggan butterflies, to be written when all the materi[illegible] understood, I propose now to present such details as are [illegible] interest in regard to some of the least familiar of these V[illegible] autochthones.

COLIAS ELIS Strecker; [illegible] variations, with information in regard to the male :—

This fine butterfly was f[illegible]y Capt. Geddes, who records the capture of the female at [illegible]g. 1st, 1884—the only definite date I find in print. The reason the Captain did not find the male was because it was not lost, but gone before. Capt. Geddes also catalogues *Colias Meadii* Edw., as collected at Laggan in the season of 1884.

Mr. Strecker's description of *Elis* may be found in "Proc. of the Acad. of Nat. Sciences of Philadelphia" for 1885, pp. 24–25. Mr. Strecker says :—

"Capt. Geddes took about fifteen examples, all females, nine of the orange form, and about six of the white; but nothing that could possibly be considered as the male. The other examples of *Colias* captured in the same locality were lemon-coloured males and females probably of one species, and allied to *Pelidne*, but bearing no kinship to the above. The most remarkable and distinctive feature of this *C. elis* is the white female; as the species, I am positive, will be found, whenever the male is discovered, to belong to a group in which albinous females are unknown, its congeners being *Hecla*, *Hela*, *Staudingeri* and *Eogene*, species in which no instance of the pale female has yet been known to occur; all of which are found only at great altitudes, or at the North Polar Regions, and are in the male distinguished from the other red or orange species by the absence of the mealy kidney or oval-shaped spot on the upper surface of the costa of secondaries near the body.

"It is curious, in regard to these albinous females of the Coliades,

that in one group they should occur in one species only, whilst in another there should be but one species, *C. Meadii*, found also at great elevation, in which they do not occur; and in yet another species, *C. Vautierii*, of the same group with the last mentioned *Meadii*, found in Chili, the female is always white, such a thing as a red one being entirely unknown."

I find nothing in print from Capt. Geddes as to the elevation at which he found his specimens of *Elis*. Mr. Strecker states it as ten thousand feet, but that is evidently incorrect: timber line in the region occurs at about seven thousand feet, and the habitable belt extends but little more than a thousand feet above that elevation, while comparatively few of the ultimate barren peaks reach a height of ten thousand feet. *Elis* is by far most frequent at a little over five thousand feet, and is often met with in appropriate localities up to about six thousand feet; it is rarely seen much higher than about six thousand feet, and never in my experience found above the tree line.

In regard to the distribution of *Elis*, I have little information. It is known to me only as inhabiting a very limited district. Eastward it becomes less frequent quite abruptly, and I have not seen it further east of Laggan than four or five miles; it probably drops out of the fauna entirely on the east within ten miles of Laggan. To the southwest, across the summit, I have found it only as far as Hector siding, three miles west of the height of land; beyond Hector its territory cannot extend far, as the decrease of altitude on the west slope at the head of the pass is very rapid, amounting to one thousand feet in the first six miles. The entire extent of the range of *Elis* from east to west, as known to me, is not more than thirteen miles. As to the distribution north and south, along the central line of the mountains, nothing is known, but in that direction its empire may be extensive. An interesting problem it is: How far the domain of *Elis* extends north and south from its thinly settled reserve on the Bow?—how far northward along the narrowing angle of the upper Rockies toward the wide-spread country of *Hecla*?—and southward, how far across a thousand miles of intervening mountainous wilderness toward the ancient villages of *Meadii* on Colorado's cloudy summits? Within the narrow limits of its known district, *Elis* is of general occurrence in localities where its food plant grows, though at few points is it ever anything but rare. A part of the best locality known to me was devastated by the fires just east of Laggan in June, 1889. *Elis* has partially established itself upon the high flats and hills between Laggan and the nearest,

mountains north, a district burned a few years ago, and will, no doubt become more frequent there in future years, as its food plant is abundant. At the summit, this butterfly and most others were well nigh exterminated in the summer of 1886 by the storm of fire which raged through the pass, sparing nothing but the little marshes and their inhabitants. Collecting there several times in 1888 and 1889, I saw scarcely a butterfly other than the two species of *Chry* live at the edges of the little swamps. These were as frec mit as I found them in their resorts elsewhere. The large vever, were lacking or were excessively rare, excepting or *talis*, which seemed to have in some degree regained a fo

The ♂ of *Elis* flies chiefly e 28th of June to the end of July. My initial date in 188 ason—was June 23. After July few ♂s are seen, and t wly out of chrysalis. The ♀s are abroad during a peric o that of the ♂s, but beginning and ending a few days l tion dates indicate a term of about five weeks, say from July 6th to August 10th or 12th. The ♂ is most frequent near the middle of July, and the ♀ a week or ten days later. The total period of the imago, including both sexes, varies in different seasons from a term of thirty-five to one of forty-five days: during the last five to ten days there are seen none in good condition—the females appear in faded finery, and rarely a tattered male lingers among the asters. There is but one flight in a summer. No indication of hybernation in imago or pupa has come to my notice. All the evidence so far obtained tends to show that the larva invariably hybernates at a very early stage, almost certainly at first stage, and that the species, in its habit of development, is a strict biennial.

Admitting *Elis* to be a distinct species, it is without doubt extremely near to *Meadii*, far closer than to any other well known form; this the ♂ especially proves. Probably its description as a distinct species was immediately due to the incident of failure to collect ♂s in the first instance.

DEFINITE CHARACTERS OF THE ♂.—Material examined, twenty-nine caught specimens. The smallest measures 48 mm., or 1.9 inch; the largest is 57 mm., equal to 2.24 inches. These measures are obtained by adding the length of the two primaries (measuring from apex to centre of base of wing) and the breadth of the body. Average expanse of the twenty-nine individuals 51.2 mm., or 2.01 inches. This is a larger butterfly than *Meadii* or *Hecla*. It is smaller than *Christina*, or even *Alex-*

andra, being nearer the expanse of *Edusa*, *Myrmidone* and *Thisoa*, and to the last one it has a more than superficial resemblance. The border of primary varies greatly in breadth in different individuals, ranging from 2.5 to 4.5 mm. in my specimens, measured at middle of outer margin: this is an important point of contrast from *Meadii* ♂, in which the breadth of the border of primary, in different individuals, is peculiarly uniform. At apex the border is not usually so broadly produced proportionally as in *Meadii*, but more nearly as in *Hecla*. At inner angle, the border is generally much produced, in which it follows the method of *Meadii* and differs from *Hecla*. As a general statement, the border of both wings is relatively much less produced in *Elis* than in *Meadii*. In the shape of the border of primary, *Elis* differs from *Meadii* definitely, though slightly, but its difference from *Hecla* is emphatic and essential. A more detailed comparison between *Elis*, *Meadii* and *Hecla* may be attempted later, with a more ample material of *Meadii* for inspection. At present it may safely be said that *Elis* is on upper surface partly near *Meadii*, and in part more like *Hecla*; that its resemblance to *Hecla* is comparatively superficial, while in essentials it is nearer *Meadii*, yet is not quite identical in the method of its pattern. On under side the differences between *Elis* and *Meadii* are not definite, nor very considerable. The cell-spot above primary is uniformly small, often sub-linear, and in six of the twenty-nine it is almost obsolete. Under hind wing the cell-spot is also small, but in five of the twenty-nine specimens it is faintly double. The presence of submarginal dark spots on under surface is scarcely to be called a feature of *Elis*, though slight traces of this submarginal row occur in twelve of the specimens. The same is true as to the "patch," or cluster of dark scales, found on costa beneath secondaries in many species of *Colias*; in *Elis* it is but feebly exhibited, traces of it being found in only seven of the twenty-nine males. Details of this kind do not constitute very interesting reading, but they are important. Such features as the cell-spots of both surfaces, the submarginal row of spots, and the costal "patch" on under side, and the nature of the marginal border on upper surface of wings,—when their averages in the several *Colias* forms have been fully collated from ample representative material of both flown and bred specimens—will prove to be efficient criteria in determining the standing of these forms.

(To be continued.)

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 75, Volume xxii.)

Genus NEMEOPHILA Steph.

1830—Steph., Ill., Brit[illegible] I., 72.

1855—Wlk., C. B. Mu[illegible] I., 623.

Head small, not retrac[illegible] vestiture. Eyes small, yet somewhat bulging or promi[illegible] moderate in length, but weak. Palpi short, straight, scarcel[illegible] ond the clypeus, clothed with short, thin vestiture. Ocelli[illegible] nnæ moderate in length, the ♂ rather lengthily bi-pectin[illegible] rmed, subequal, the posterior longest, rather closely scale[illegible] nct.

Primaries with accesso[illegible] giving off 7-10 from its apex, 4 and 5 close together, well[illegible] 3.

Secondaries with 3, 4 and 5 almost equidistant from the end of the submedian; 6 and 7 together from the end of the subcostal, which latter gives off 8 from about the middle of its course.

The species in this genus are variable and the relation of the described forms is by no means fixed. As usual I follow Mr. Grote's List, without, however, intending to subscribe to the correctness of the synonymy.

N. geddesi Neum.

1883—Neum., Papilio III., 137, *Nemeophila.*

Habitat—N. W. Brit. Col.

N. modesta Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 113, *Platarctia.*

1882—Grt., New List, 16, *Nemeophila.*

Habitat—California.

N. petrosa Wlk.

1855—Wlk., C. B. Mus., Lep. Het., III., 626, *Nemeophila.*

1872—Pack., 4th Rept. Peab. Ac. Sci., 85, *Nemeophila.*

1874—Streck., Lep. Rhop., et Het., I., 79, =*plantaginis.*

1878—Streck., Pr. Dav. Ac. Sci., II., 272, pl, IX., ff. 2-4, =*plantaginis* Linn.

1879—Strk., Rept. Chief Eng., 1878-79, V., p. 1859, =*plantaginis.*

1882—Stretch, Papilio, II., 92 (variations), *Nemeophila.*

var. *cæspitis* Grt. & Rob.

1868—Grt. & Rob., Trans. Am. Ent. Soc., I., 337, pl. VI., f. 43, *Nemeophila.*
1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 75, *Nemeophila.*
1873—Grt. & Rob., Trans. Am. Ent. Soc., IV., 248, *Nemeophila.*
1879—Strk., Rept. Chief Eng., 1878-79, V., 1859, =var *plantaginis.*
var. *cichorii* Grt. & Rob.
1868—Grt. & Rob., Trans. Am. Ent. Soc., I., 338, pl. VI., f. 44, *Nemeophila.*
1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 75, *Nemeophila.*
1873—Grt. & Rob., Trans. Am. Ent. Soc., IV., 428, *Nemeophila.*
1879—Strk., Rept. Eng., 1878-79, V., 1859, =var. *plantaginis.*
var. *geometrica* Grt.
1865—Grt., Proc. Ent. Soc., Phil., IV., 318, pl. II., f. 1, *Eupsychoma.*
1872—Pack., 4th Peab. Rep., 86, =*petrosa.*
1875—Pack., Rept. Geol. Surv. for 1874, 559, *Nemeophila.*
1878—Strk., Proc. Dav. Ac. Sci., II., 272, pl. IX,. f. 3, *plantaginis.*
1879—Strk., Rept. Chief Eng., 1878–79, V., 1859, *plantaginis.*
1879—Grt., CAN. ENT., XI, 209, *Nemeophila.*
geometroides G. & R.
1868—Grt. & Rob., List N. A. Lep., p. VIII., *Eupsychoma.*
ab. *hospita* Schiff.
1878—Strk., Proc. Dav. Ac. Sci., II., 272, *Nemeophila.*
Habitat—Calif., Rocky Mts., Colo.

A very variable species. Mr. Strecker mentions the early stages in his paper in the Rept. Engin. for 1878–79, and refers everything to *plantaginis.* How far he is correct I will not venture to say at present; but this much I can say, I have never in all the series seen by me found anything which was like the series of European specimens. That all these names refer to one variable species is not, I think, disputed.

N. scudderi Pack.
1864—Pack., Proc. Ent. Soc., Phil., III, 113, *Platarctia.*
1872—Pack., 4th Rept. Peab. Ac. Sci., 86, *Nemeophila.*
Habitat—Brit. Amer., Calif.

N. selwynii Hy. Edw.
1885—Edw., CAN. ENT., XVII., 65, *Nemeophila.*
Habitat—Ontario.

Genus SEIRARCTIA Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 119.
1873—Stretch, Zgy. & Bomb., 81.

Antennæ of ♀ short, with joints marked but scarcely serrate, the sides ciliated. Head moderate in size, closely applied to the thorax, but not sunken. Tongue obsolete. third joint equal to the second in length, not much exce straight. The eyes are rather large, but not prominent. t. Vestiture long and hairy. Legs short, fore-tibiæ shor a long claw at tip, middle and posterior tibiæ nearly equa h armed with a pair of short terminal spurs only.

No male has been unde nd I cannot therefore speak of the characters of that sex.

Primaries without acce a to ten on a stalk out of the end of the subcostal at the a six; ten from nearest to base of stalk to costa; seven next to outer margin; eight and nine forking close to tip, the former to apex, the latter to costa; four and five together from the end of median; three from median some little distance before the end. Secondaries six and seven together from end of subcostal; four and five together from end of median; three some little distance before the end; eight, as usual, from about the middle of subcostal.

These studies were all made on a ♀, *S. echo.*

S. clio Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 120, *Seirarctia.*
1872—Stretch, Zyg. & Bomb., 82, pl. 3, f. 1, *Seirarctia.*
1882—Behr.,* Papilio II., 187, biol. notes.
Habitat—California.
Food plant—*Apocynum androsœnifolium.*

S. echo Sm. & Abb.

1797—Sm. & Abb.*, Ins., Ga., II., 135, pl. 68, *Phalæna.*
1816—Hübn., Verzeichniss, 184, *Estigmene.*
1856—Wlk., C. B. Mus., Lep. Het., III., 668, *Spilosoma.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 531, *Hyphantria.*
1862—Morris, Synopsis, Supplt., 342, *Spilosoma.*
1864—Pack., Proc. Ent. Soc., Phil., III., 120, *Seirarctia.*
1865—Wlk., C. B. Mus., Lep., Het., XXXII., 352, *Hyphantria.*

1889—Slosson*, Ent. Amer., V., 153, larval habits.
1890—Slosson*, Ent. Amer., VI., 8, larval habits.
Habitat—Georgia, Florida, Dist. Col.
Food plants--Oak, Persimmon, Palmetto: omnivorous.

Seirarctia bolteri does not belong to this genus, and has been referred by its describer to *Halisidota ambigua*.

Genus *Ectypia* Clem.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 529.

E. bivittata Clem.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 530, *Ectypia*.
nigroflava Graef.
1887—Graef., Ent. Amer., III., 43, *Spilosoma*.
Habitat—Texas.

A poor specimen of this species is in the collection U. S. National Museum, also from Texas. I did not recognize it as Clemen's species until I had identified it with Mr. Graef's description. Mr. Hy. Edwards subsequently called Mr. Graef's attention to the probable synonymy, and there remains no doubt that Clemens' species is again known in collections. I have no notes on the genus, and believe it will either not prove a good one or some other must fall in with it.

Genus PYRRHARCTIA Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 120.

Head small, somewhat retracted. Tongue short and weak. Palpi very short, scarcely reaching the front. Antennæ very short, simple in both sexes. Legs stout, moderately long; spurs short, middle tibiæ with one, posterior with two pairs. Fore tibiæ without armature. Claws with tips toothed.

In venation this species does not differ from *Leucarctia*, which will be fully described in this respect. The remarkable male characters of this genus have been described and figured by me.

P. isabella Sm., Abb.

1797—Sm., Abb.*, Lep., Ga., II., 131, pl. 66, *Phalæna*.
1816—Hübn., Verzeichniss, 184, *Estigmene*.
1833—Harris, Cat., Ins., Mass., 591, *Arctia*.
1841—Harris*, Rept. Ins., Mass., 59, *Arctia*.
1855—Wlk., C. B. Mus., Lep. Het., III., 611, *Spilosoma*.
1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 531, *Spilosoma*.

1862—Harris*, Inj. Ins., Flint ed., 335, f. 170, *Arctia.*
1862—Morris, Synopsis Lep. Supplt., 340, *Arctia.*
1862—Clem., App. to Morris Syn., 352, *Spilosoma.*
1863—Saund., Syn. Can. Arct., 16, *Spilosoma.*
1864—Pack., Proc. Ent. Soc., Phil., III., 121, *Pyrrharctia.*
1869—Saund.*, CAN. ENT., I., 26, *Spilosoma.*
1870—Riley*, Am. E
1871—Riley*, Am. E
1872—Riley*, 4th Re
1873—Edw.*, Proc. (
1876—Moeschl., Stett.
1878—Mann*, Psyche
1880—Riley*, Am. E
1881—Riley*, Gen. I
1882—Coleman*, Pa
1883—Weed, Papilio,
1884—Bean*, CAN. ENT., XVI., 07, *Spilosoma.*
1886—Smith, Ent. Amer., II., 79, *Pyrrharctia.*
1888—Dimmock (A. K.)*, Psyche, IV., 281, *Spilosoma.*
Coleman, Journ. Bost. Zool. Soc., I., 28, *Spilosoma.*

californica Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 121, *Pyrrharctia.*
1872—Pack., 4th Rept. Peab. Ac., 86, pr. syn.
1873—Butler, Cistula Ent., II., 39, pr. syn.
Habitat—United States and Canada.
Food plants—Omnivorous.

(To be continued.)

CORRESPONDENCE.

ERRATA TO THE REVISED CHECK LIST OF N. AM. NOCTUIDÆ.

Dear Sir: Although the list was nearly three months in press, from end of December to beginning of March, and I had a large number of proofs, I find that three mistakes escaped correction which I desire to note in this place:—No. 211, for *Harv.* read *Harr.;* No. 359, for *Harv.* read *Harr.;* No. 802, for *Grt.* read *Morr.* Students using the list will please note these necessary changes.

April, 1890. A. R. GROTE, Bremen, Germany.

Mailed May 2nd.

The Canadian Entomologist.

VOL. XXII. LONDON, JUNE, 1890. No. 6.

THE NOCTUIDÆ OF EUROPE AND NORTH AMERICA COMPARED.

(Seventh Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

We have now passed in brief review the bombyciform *Noctuidæ*, or *Thyatirinæ*, and the typical *Noctuidæ*, or *Noctuinæ (Noctuæ nonfasciatæ)*. The former group differs in certain details of the neuration, and the question comes up as to the value of this character for classification. In all other respects, this small assemblage of moths must be considered as belonging to the *Noctuidæ*. The palpi, though short, have the Noctuid form. The eyes are sometimes naked, sometimes hairy. The legs, though somewhat short, are not unlike those of other owlet moths; the fore pair have a tibial epiphysis so far as known to me. The fore wings are subtriangular with pointed apices. The resemblance to the *Notodontinæ* is seen in the neuration of primaries where vein five is intermediate, though this vein is sometimes wanting in the Bombycid group. But in *Nolaphana*, which Fitch considered a Tortricid, Zeller at first a Nolid, vein five seems also intermediate. This character of vein five of fore wings is, perhaps, of more value than the variations of the secondary costal veins. The difference in the position of vein seven of hind wings is, perhaps, not so important when we see that, in *Stilbia* and *Rivula*, vein eight springs from seven, the upper margin of the median cell. This is also the case with *Cerathosia*, and we may briefly consider the position of this moth. The name is derived apparently from the Greek *Keras*, a horn, in allusion to the clypeal tubercle perhaps; and *thosia*, whatever that may be, I know not. It looks like a piece of *Lithosia*, a name derived from the Greek *lithos*, a stone, so that it might seem as though Mr Smith intended

to classify the moth as a Lithosian before asserting it to be an Arctian, "next to Utetheisa." I have already pointed out Mr. Smith's misstatements as to the neuration. These corrected, we have before us a Noctuid in all structural characters, except that the secondaries have vein eight of seven; but thus also paralleled by *Stilbia*. On the fore wings vein five originates near four, and runs nearer four than six. The clypeal tubercle and the legs, with a claw on , as I have said, the *Stiriini*, and, so far as I can see fro imens, the tegulæ do not lie close to the thorax. But the sembles that of *Tarache*, and we may place the moth after d before *Spragueia* and the *Eustrotiini*. Since 1868, I h ied in bringing our *Noctuidæ* into natural genera, founded o posed by Lederer, characters used also by prominent recent ch as Prof. Fernald and Lord Walsingham. It is therefore Mr. Smith to accuse me of ignorance of Lederer's defin will be better not to discuss any further Mr. Smith's rema us. The question whether relatively slight variations in the neuration can establish natural families in the Lepidoptera, is not to be decided after the fashion of Mr. Smith, but must be reasonably discussed. I have shown cases of individual variation in neuration, and science has not yet removed the scales and studied the veins of all the species of moths. We must not fall into the fault of tucking away an insect under a scientific label, but constantly occupy our minds with its various characters until its affinities become clear to us.

We may now enumerate the tribes into which I have divided the *Noctuinæ*. It may be premised that the genera thus associated may, in some instances, need transference. The limits between certain of these tribes seem faint, and I have had to rely often on somewhat vague and general characters for their definition. Unlike the Coleoptera, the investigator of the Lepidoptera is often at a loss to find structural features, so uniform is the general character, so soft the body parts, clothed with dense hair and scales, difficult to remove so that the external skeleton be studied. I have recognized the divisions of tribes, sub-families and families, and have endeavored to follow Leconte in his classification of the Coleoptera in my nomenclature. I think we should make a distinction between the characters employed for these divisions, and that we should not allow for a subordinate structural character a "family" value. On

this head the student is referred to a most valuable paper by Dr. Packard on the *Noctuidæ*, published in the Proceedings of the Portland Society of Natural Sciences, I., 153. This paper should be reprinted. It speaks of the natural value of the great families of moths, and contains statements of fact and admonitions to students, which can only be disregarded to the detriment of the study. From the relative intangibility of the structural characters of butterflies and moths, arises some necessary latitude of opinion. In no case is there any excuse for an improper criticism of the opinions of older or of more experienced writers. Rather is there room for a gentler treatment of this subject of our moths, these pretty locks of nature's fleece, so tender and so fleeting! In the paper above alluded to, Dr. Packard complains of the effect of amateurism on the literature of the science. No doubt in one sense the remark is well founded, but this amateurism is rather a proof of the attractiveness of the study and its aesthetic value. For my part I should be glad of the largest possible accession to the ranks of butterfly hunters and students, and I have tried always to do what I could toward creating a larger interest in this field. Elsewhere I have drawn attention to the greater general interest felt in England on the subject, and how valuable an addition to the charms of life the collection of butterflies and moths is proved to be. For this reason I have favored the gradual use of English names, and I have looked forward to the time when the distinction between "amateurs" and "scientists" should be obliterated by good work being done on all hands. Far more do I incline to disapprove of the work of those, whose temperament and training allow them to misrepresent what others have said and done, in order to ease their wounded vanity, or rise by improper criticism. Let us forsake such conduct. We are, as Mr. Scudder would call us, Aurelians, although this title smacks a little of the hobby, and it were well if our kinship in interest would make us kind. There cannot be an agreement, as the world is infinitely diverse.

The tribes of Noctuinæ I have defined are:—1, *Bombycoidi;* 2, *Apatelini*, including *Bryophila*, although the disposition of the American genera is not settled between these two first tribes; 3, *Agrotini;* 4, *Dicopini*;* 5, *Hadenini;* 6, *Arzamini*;* 7, *Nonagriini;* 8, *Scolecocampini;* 9, *Nolaphanini**, only *Nolaphana;* 10, *Caradrini;* 11, *Orthosiini;*

* These groups do not occur in the European fauna.

12, *Calocampini*, only *Lithophane (Xylina)*, *Lithomia*, *Calocampa* and *Xylomigis*; 13, *Cleophanini*, only *Cleophana*. I regard *Nyctophœata* as a Heliothid; 14, *Cuculliini*; 15, *Eurhipiini*; 16, *Ingurini**; 17, *Anomiini**; 18, *Litoprosopini**; 19, *Calpini*; 20, *Stiriini*; 21, *Plusiini*; 22, *Heliothini*; 23, *Tarachini*; 24, *Cerathosiini*; 25, *Eustrotiini*; 26, *Hyblæini*.

There remain to be cons metriform *Noctuidæ*, or the *Catocalinæ (Noctuæ fasciata* orm *Noctuidæ*, or the *Deltoidinæ* and a small sub-famil *ephinæ*, containing only two genera, with few species, foun atitudes and elevations over Europe, Siberia and North A of a preglacial fauna. The genera are *Brephos* and *Leuco*

As may be drawn from the pplied to the leading groups, the *Noctuidæ* are a large fa us resemblances to the surrounding families of moths. oths touch the Spinners, the Spanner and Sparkler moths, w l *Noctuinæ*, from their total form and embryology, bring the whole family, in a linear arrangement, between the two first. In number of species and structural variation the *Noctuidæ* yield to no other in interest, and its large representation in North America commends it to the attention of the student. For the student I have at least originally shown the way his studies in this group should be carried on. The matters of detail have not always seemed so important to me as the method, and this method I have originally introduced into the study, combining my reading with observations under the microscope. There is growing up a tendency, especially in Europe, where the living material is wanting, to engage in a sort of book working of nature. The new student constructs, out of the writings and pictures of others, some new turn to our views of life and variation, fancying even that Darwin may be damaged by such methods. It is vanity displayed in vain.

Sub-family *Catocalinæ*.

The earliest recognition of this group which I find in literature is that of Borkhausen, who calls this *Noctuæ fasciatæ*, in contradistinction to the *Noctuinæ*, or *Noctuæ nonfasciatæ*. These terms are clumsy and had better give way to those proposed by Packard (Proc. P. S. N. H., Vol. I., 153, et seq.). The wings are broad; primaries triangulate; secondaries

full, tending to be marked by continuous bands. The eyes are naked; antennæ generally simple; body usually untufted; abdomen smooth and tapering; the dorsal surface rarely crested; the tibiæ not unfrequently armed. Packard says that the epicranium is longer than in the *Noctuinæ*. The basis of this sub-family is comparative form. No single structural feature holds the genera together, and Lederer does not recognize its existence. Nevertheless the moths and larvæ seem to me more or less readily distinguishable, and that we may retain the sub-family term. Dr. Packard says (l. c.) that these two sub-families "agree in the main with the *Trifidæ* and *Quadrifidæ* of Guenèe, though the use which he makes of the venation seems to us to lead to artificial distinctions. The very constant venation of this family does not admit of any variation in the grouping of these veins and their branches, and hence they offer characters of secondary importance." With this statement my experience fully agrees. I do not think that the venation alone should decide family position. There are already too many exceptions known to the system of Herrick-Schæffer, which is, in some cases, considered the test of family character by Lederer. I regard this paper of Dr. Packard's as of fundamental value in the study of the *Noctuidæ*; the author, however, excluded the Deltoids, which, I think, from *all* their characters are *Noctuidæ*. It is not at all clear also, whether Dr. Packard considers the *Thyatirinæ* as a distinct sub-family group. Probably not, and that they are merely a tribal division of the *Noctuinæ*. To this view I should not seriously object, although I do not venture to decide upon it. The unequal characters by which we separate the *Thyatirinæ* and *Brephinæ* from the rest of the *Noctuidæ* are an objection to Lederer's classification. In the present series of papers the object is mainly to compare the fauna and the full discussion of this and similar points, must be left to a future occasion. Primarily this sub-family falls into two groups:—First, the tribe *Catocalini*, in which the secondaries, though often gaily coloured, are covered by and subordinated to the primaries. The European genera belong chiefly to this tribe. Secondly, the *Pheocymini* (*Pheocyma*, *Homoptera*, *Erebus*, etc.,) in which the secondaries are partially exposed and marked like the forewings, decidedly geometriform moths. The larva thus first becomes geometriform as we recede from the higher *Noctuidæ*, and then the perfect insect follows suit.

NEW NORTH AMERICAN HOMOPTERA.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

IDIOCERUS CRATÆGI, n. sp.

Soiled white. Antenna dot on each ocellus, a pair of large round spots on the v ar spot behind each eye, the basal angles of the scutellu and disc of the pleural pieces, black; the elytra whitish hy ith fuscous nervures. Length about 6 m.m.

Front slightly convex, th lly converging to the rounded apex. Clypeus narrow, at ptly but not widely expanded; loræ rather narrow; outer n eeks feebly concave. Pronotum short, hind edge obsc the posterior angles rounded.

Colour soiled whitish; tinged more or less with yellowish green on the margins of the vertex and face, sides of the pronotum, scutellum, basal and costal nervures of the elytra, and on the connexivum. A curved longitudinal cloud on each side of the front, and two subtriangular oblique spots between the ocelli, brown; these marks may be obsolete, or they may be deepened to piceous black in places. A narrow triangular spot below the antennæ, a dot on each ocellus, and a large round spot above the latter on the vertex, deep black. Eyes brown. Antennæ white, setæ brown. Pronotum with an oblong black spot on the anterior margin behind the inner angle of each eye, disc sometimes with an indistinct brownish cloud. Scutellum with a large triangular spot within each basal angle, and two dots before the transverse depression, black; the middle of the anterior field sometimes clouded with brown. Elytra whitish hyaline, ordinarily with heavy brown nervures; the shoulder, commissure and claval suture yellow, costal nervure at base brown. Wings slightly smoky, iridescent; nervures brown. Pleural pieces black, edged with pale yellow. Legs soiled white, tarsi black. Tergum black; connexivum yellow; venter yellowish, sometimes clouded with brown, laterally; pygofers in both sexes black, edged with pale.

Genital pieces, male: Last ventral segment large, subtriangular, convex, longer than the two preceding, and covering the pygofers for about

half their length; the latter broad and short, almost cylindrical, meeting on the ventral aspect nearly to their tips, thus forming a small opening around the anal style, a little separated basally beneath the ultimate ventral segment; plates slender, weak and flaccid, but slightly exceeding the pygofers in length, fringed with long soft hairs. Female: Last ventral segment as in the male, except that the apex is truncated or slightly concave; pygofers short and thick, the blunt apex but little exceeded by the ovipositor.

Buffalo, N. Y., July and August, occasional on thorn bushes; Hamilton, Ont., James Johnston, Esq. Described from five male and six female examples.

Allied to *I. lachrymalis*, from which it can be readily separated by its smaller size, different markings, and the form of the genitalia.

L'Abbe Provancher, in his Petite Faune Ent. du Canada III., p. 288 (Jan. 1890), describes a very pretty little species of *Idiocerus* as *Bythoscopus clitellarius* Fitch, with the reference "Third Rept. Inj. Ins. p. 69"; this should have read No. 69, and may be found on p. 365 of the Trans. N. Y. State Agl. Soc. for 1856. Fitch, however, here refers to *Jassus clitellarius* Say, a species of *Thamnotettix* and not to the insect described by M. Provancher, for which I now propose the name *Idiocerus Provancheri*. This conspicuous little insect pertains to the group represented by *I. maculipennis* Fitch. It is not uncommon here at Buffalo on oak and other bushes through June, July and August. I have also taken it at Muskoka, Ont., and have seen examples captured at Hamilton, Ont. by Mr. James Johnston.

Since the publication of my paper on Pediopsis in Ent. Am. for Sept., 1889, I have received from M. Provancher a pale example of *Bythoscopus fenestratus* Fitch., labelled *Pediopsis flavescens* Prov., and accompanied by a note stating it to be a typical example. It agrees well with his description in the Nat. Can., IV., p. 376, Dec., 1872, and it is the insect described as *Pediopsis flavescens* on p. 295 of the Petite Faune Ent. du Can., Feb., 1890. This, therefore, leaves the insect described by me as the *flavescens* (Ent. Am., V., p. 173, No. 7) without a name. It is a well characterized species, and may be called *Pediopsis canadensis*.

PLATYMETOPIUS FRONTALIS n. sp.

Smaller and shorter than *P. acutus*. Blackish fuscous, sparingly irrorate with pale; face pale yellow. Length about 4 m.m.

Vertex shorter than in *acutus*, one-quarter longer than broad between the eyes, with a longitudinal depression, apex obtuse. Cheeks broader, and the clypeus shorter and ı *acutus*, the sides of the latter almost rectilinear. Head, abdomen, closely punctured. Pronotum smooth, obscure, wrinkled. Last ventral segment of the male rather deep lve large and rounded; plates triangular, on the impressed ıs long as the valve, apex subacute, margins sparsely ciliate ɔngated, surpassing the plates. Last ventral segment of the lightly keeled and compressed apically, the hind edge feebly ıe middle, pygofers short and broad, scarcely exceeded by

Colour fuscous, or almost ior disc of the vertex, pronotum, scutellum, and all beneath, minutely but sparingly irrorate with pale; vertex and venter of the male almost immaculate. Apex of the vertex whitish, with some irregular fuscous lineations on either side of the central line; face yellow, cheeks infuscated exteriorly, base of the front with but faint indications of the concentric lines characteristic of our other species. Pronotum, with five whitish longitudinal lines, faintly indicated. Nervures of the elytra bordered with interrupted pale lines that sometimes form reticulations on some of the areoles; costal area outwardly whitish hyaline, crossed by about eight oblique blackish veinlets; apical areoles, excepting on their base fuscous, the extreme edge pale. Elytra normally with about fifteen round whitish dots placed on the ends of the areoles, but more or less of the basal are frequently wanting. Wings sordid hyaline, nervures fuscous. Tibiæ spotted with pale; tarsi pale, the joints tipped with black.

Described from two ♂ and five ♀ examples. Buffalo, N. Y., June and September; Ames, Iowa, (H. Osborn).

I have swept this species from low bushes and weeds with *P. acutus*, from which it may readily be distinguished by its smaller size and blackish colour. *P. acutus* has the sides of its clypeus concave, and the apex of the valve of the ♂ obtusely pointed. *P. modestus* Stæl is unknown to me, as is also *P. magdalensis* Prov., but these are larger pale species.

DESCRIPTION OF A NEW SPECIES OF ARGYNNIS FROM CANADA.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Argynnis Alberta.

Belongs to the *Chariclea* group.

Male.—Expands 1.9 inch. Upper side pale yellow-fulvous; the markings as in *Helena*, but pale black, reduced; the mesial stripes on both wings interrupted, macular; the extra discal rounded spots on primaries minute, the sub-marginal crescents wanting, and represented by small clusters of scales at the summits only, leaving a clear space to the margin, which margin is edged by an even stripe; on secondaries the rounded spots are larger, and the crescents are represented by larger clusters of scales; the marginal border is extended on each nervule so as to encroach on and make narrow the clear space. Under side of primaries pale red-brown, uniform from base to margin; the black markings obsolescent or altogether wanting. Secondaries brown (without the red shade); across the disk a belt of same form as in *Chariclea* and *Helena*, a shade only lighter than the ground, and all of one hue (no white as in the allied species); the rounded spots and clusters of scales repeated faintly, and behind each of the latter a pale, undefined patch.

Female.—Same size. Brown, dusky, inclining to melanism, sometimes of a slaty hue rather than brown, and always with a peculiar smooth surface, suggestive of grease which had been removed by benzine; the markings pale, diffuse; the mesial stripe, on primaries, has become a broad band reaching from margin to margin, and the sub-marginal clusters of scales are merged in a continuous stripe; on secondaries, all the markings about base and on disk are obsolescent, the sub-marginal clusters are large and diffuse, and the margin is edged by a crenated band. Under side as in the male.

From one ♂ and two ♀ sent me by Mr. Thomas E. Bean, and taken at Laggan, Alberta. He writes: "This Argynnis, I think, occurs strictly above timber line, and not very near it either, though also not at the highest points of the mountains. In 1888, on one mountain, it was decidedly frequent, but in 1889, I saw not one. The females all present the same slightly shining surface, whether brown or slate in color, but it is not grease. The examples I sent you were not in the least greasy, nor

are any that I have." (This was in direct reply to my question, suggested by Dr. Holland, who was confident they had been greased and cleaned.) "I do not notice this shiny surface especially in the males; they are all fulvous, and none show melanism. All the females tend to obscuration, and more than half are about as melanic as those sent you, one or two perhaps a little darker. Some few are clear enough for the fixed lines to show. This form does not : same localities as *Chariclea*, which only occurs below tim know."

Alberta is wholly unlike the group known to me. It does not at all agree with *Ch curata* McLachlan.

In the delicacy of its male is nearer *Helena* than *Chariclea*, but these are inter duced. *Helena* is an alpine species, and found above tim it retains at every elevation which it frequents the sam e examples under view are larger than any *Helena*, and t *Chariclea*.

NOTES ON SIGALPHUS CURCULIONIS AND SIGALPHUS CANADENSIS.

BY C. P. GILLETTE, AMES, IOWA.

I reared from *Conotrachelus nenuphar* last summer a number of parasites, which were determined for me by Dr. Riley as *Sigalphus curculionis* Fitch, and *S. curculionis*, var. *rufus*. Full descriptions of both of these may be found on page 27 of Riley's Third Missouri Report, and upon page 67 of the Supplement to the Missouri Reports.

The variety *rufus* appeared much more abundant than *curculionis* in my breeding cages the past summer. These two forms differ so much from one another, and in some respects, especially in the number of joints of the antennæ, from Riley's descriptions, that I have made the following notes upon them :—

Three females of the dark form, bred by myself, and two males loaned me by Prof. Osborn, have the ocelli in every case, not touching, but distinctly separated. The two males have respectively 29 and 30 joints in the antennæ. Two of the females have 29 joints each, and one 28 joints in the antennæ. The largest female measures just .14, and the males

measure a scant .13 of an inch in length. The ovipositor is exserted in one case .11, and in two cases .12 of an inch. Length of wing .14 of an inch; length of antennæ .125 of an inch. The breadth of the head, as compared to *rufus*, is as five to six.

In the eleven specimens of *rufus* now in my collection the ocelli are in every case distinctly separated. In five cases the antennæ are 32-jointed; in four cases they are 31-jointed, and in two cases they are 30-jointed. All are females, and in no case do they vary much from .15 of an inch in length. The shortest measurement of exserted ovipositor is .14, the average is .18, and the longest is .20 of an inch in length. The breadth of the abdomen, as compared to *curculionis*, is in the proportion of four to five. Length of wing .15 of an inch; length of antennæ .15 of an inch. *Rufus* is decidedly more robust and larger in every case than *curculionis*, and, were it not for the fact that so eminent an authority as Dr. Riley considered them the same species, I should think that *rufus* ought to be raised to the rank of a species.

Sigalphus canadensis.—Three specimens of *S. canadensis* were reared by me the past summer from the plum gouger *Anthonomus scutellatus (prunicida)*. How this little braconid can deposit her egg within the hard pit of the plum, I am unable to say. It can not be that it is deposited there before the pit becomes hard, for the larva of the gouger does not get entirely through the pit until the latter becomes very hard, and the parasite does not attack the larva of the gouger in time to prevent its complete development and pupation, as was found by cutting into the plums containing parasitized pupæ of *Anthonomus scutellatus*. When the larva of the gouger becomes full grown it gnaws a hole through the pit, out of which it can escape when it has changed to a beetle, and the parasite is dependent upon this provision of the larval gouger for its own escape. Possibly the parasite does not deposit the egg until the opening has been made in the pit; but, if this is the case, it must go through its transformations in a very short time. And how would the female know at what part of the plum to insert her ovipositor to strike the small opening in the pit? Although but three of these parasites were secured, it was not uncommon to find a plum with a small exit, such as is made by the mature parasite in escaping, and which is much too small for the exit of the gouger.

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 104, Volume xxii.)

Genus [illegible]tretch.

1873—Stretch, Zygænida[illegible]dæ, 118.

Head small, hardly retra[illegible] conspicuous, bulging; ocelli distinct; vestiture thin, loose[illegible]nt; tongue weak and short, spiral; palpi weak, short, dr[illegible]hin divergent vestiture; legs sub-equal, posterior slightly the[illegible]ldle and posterior tibiæ each with minute terminal spurs onl[illegible]x is short, stout, convex with thin hairy vestiture. The an[illegible]f the female have the joints marked, scarcely serrate; in t[illegible]e bipectinate. The primaries have 7 to 10 out of a long stal[illegible]l of the sub-costal, 6 from a short spur out of the same point; 3, 4 and 5 are nearly equi distant from the end of the median, and quite close together. On the secondaries 8 as usual, 6 and 7 from the end of the sub costal; 3, 4 and 5 rather close together from the end of the median. I had intended to give a review of Mr. Butler's work on this genus (1881, Ann. Mag., N. H., ser. 5, VIII., 312), but the excellent paper by Mr. French in the November-December, 1889, numbers of the CAN. ENT. has rendered this unnecessary, and I simply give the bibliography, using Mr. French's sequence of species or varieties. Whether in a genus like this, where no two specimens are alike, so many names are desirable is a question. Twice the number could be as justly applied. A large series of specimens is in the United States National Museum, one lot bred from eggs produced by a ♂ *stretchii* with a ♀ *lena*—the extremes of the series as arranged by Mr. French.

L. stretchii Butler.

1881—Butl., Ann. Mag. N. H., 5, VIII., 312, *Leptarctia.*
1889—French, CAN. ENT., XXI., 222, f. 12, *Leptarctia.*
♂ *dimidiata* Str.
1873—Stretch, Zyg. & Bomb., pl. V., f. 9, *Leptarctia.*
1881—Butler, Ann. Mag. N. H., 5, VIII., 312, *typ. pr.*
Habitat—Oregon, So. California.

L. boisduvalii Butler.

1881—Butler, Ann. Mag. N. H., 5, VIII, 313, *Leptarctia.*
1889—French, CAN. ENT., XXI., 222, f. 13, *Leptarctia.*
decia Stretch.
1873—Stretch, Zyg. & Bomb., pl. V., f. 15, *Leptarctia.*
1881—Butler, Ann. Mag. N. H., 5, VIII., 313, *typ. pr.*
Habitat—Oregon.

L. dimidiata Stretch.

1873—Stretch, Zyg. & Bomb., 123, ff. 7-10, *Leptarctia.*
1881—Butler, Ann. Mag. N. H., 5, VIII., 313, restr. to f. 7 and 8.
1889—French, CAN. ENT., XXI., 222, f. 14, *Leptarctia.*
Habitat—Calif., Oregon, Colorado.

L. albifascia French.

1889—French, CAN. ENT., XXI., 232, f. 15, *Leptarctia.*
Habitat—California.

L. occidentalis French.

1889—French, CAN. ENT, XXI., 223, f. 16, *Leptarctia.*
Habitat—Northern California.

L. latifasciata Butler.

1881—Butler, Ann. Mag. N. H., 5, VIII., 313, *Leptarctia.*
1889—French, CAN. ENT., XXI., 223, f. 17, *Leptarctia.*
Habitat—Oregon, So. California.

L. fulvofasciata Butler.

1881—Butler, Ann. Mag. N. H., 5, VIII., 313, *Leptarctia.*
1889—French, CAN. ENT, XXI., 223, f. 17, *Leptarctia.*
lena Stretch.
1873—Stretch, Zyg. & Bomb., pl. 5, ff. 13-14, *Leptarctia.*
1881—Butler, Ann. Mag. N. H., 5, VIII., 313, *typ. pr.*
Habitat—Oregon, Truckee Calif.

L. californiæ Walker.

1855—Wlk., C. B. Mus. Lep., III., 625, *Nemeophila.*
1873—Stretch, Zyg. & Bomb., 240, = *lena.*
1881—Butler, Papilio, I., 130, *an sp. id. lena.*
1881—Butler, Ann. Mag. N. H., 5, VIII., 312, *Leptarctia.*
1889—French, CAN. ENT., XXI., 223, ff. 18-19, *Leptarctia.*

lena Bdv.
1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 73, *Lithosia.*
1873—Stretch, Zyg. & Bomb., pl. V., ff. 11 and 16, *Leptarctia.*
adnata Bdv.
1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 73, *Lithosia.*
1873—Stretch, Zyg. & Bomb. 120, *pr. syn.*
1881—Butler, Ann. Mag I., 313, *pr. syn.*
Habitat—Calif., Oregon.

L. wrightii French.
1889—French, CAN. ENT f. 18-19, *Leptarctia.*

L. decia Bdv.
1869—Bdv., Lep. Cal. (Ann Belg., XII.), 72, *Lithosia.*
1873—Stretch, Zyg. & B 5, ff. 1, 2 and 15, *Leptarctia.*
1878—Strecker, Proc. D ., 273, *Leptarctia.*
1881—Butl., Ann. Mag. ., 314, *Leptarctia.*
1889—French, CAN. ENT., f. 20, 21, *Leptarctia.*
Habitat—California, Oregon.

L. lena Bdv.
1869—Bdv., Lep. Cal. (Ann Soc. Ent., Belg., XII), 73, *Lithosia.*
1873—Stretch, Zyg. & Bomb, 120, 240, pl. V., ff. 3–6, 11–14, 16.
1881—Butler, Ann. Mag. N. H., 5, VIII., 314, restr. to ff. 3 and 5.
1889—French, CAN. ENT., XXI., 224, f. 22, *Leptarctia.*
Habitat—California, Oregon, Colorado.

This arrangement, giving each of the forms equal value, is of course not to be taken as indicating the specific distinctness of any. The indications are all that there is but a single species with a wide range of variation. It remains only to state that in Mr. French's paper he gives the life history of the species, describing all stages.

Genus KODIOSOMA Stretch.

1873—Zyg. & Bomb., 67.

This genus contains a series of forms of doubtful distinctness, none of which I have been enabled to study. The species seem excessively rare, and there are no specimens of the genus in the collection U. S. National Museum.

K. eavesii Stretch.

1873—Stretch, Zyg. & Bomb., 69, pl. II., f. 6, *Kodiosoma.*

Habitat—Nevada.

K. fulva Stretch.

1873—Stretch, Zyg. & Bomb., 67, pl. 2, f. 7, *Kodiosoma.*

Habitat—California.

K. nigra Stretch.

1873—Stretch, Zyg. & Bomb., 68, pl. 2, f. 8, *Kodiosoma.*

Habitat—California.

K. tricolor Stretch.

1873—Stretch, Zyg. & Bomb., 68, pl. 2, f. 5, *Kodiosoma.*

Habitat—California.

Genus PHRAGMATOBIA Steph.

1830—Steph., Ill. Brit. Ent. Haust., II., 73.

1855—Wlk., C. B. Mus., Lep. Het., III., 628.

1862—Morris, Synopsis, 346.

Head small, retracted; tongue weak and short, palpi rudimentary. Vestiture woolly. Antennæ simple in both sexes. Legs weak and rather short; tibial spurs distinct and normal in number. The anterior and middle claws seem simple; posterior with a decided tooth at tip. The tarsi are very feebly spinulose.

Primaries with 7 to 10 out of a stalk from the end of subcostal; 7 and 10 from about the same point; 8 and 9 forking just before the apex; 3, 4 and 5 are about equi-distant from the end of the median.

Secondaries veins 6 and 7 together from end of subcostal, 8 from its middle; 3, 4 and 5 from the end of the median rather close together; 4 about twice as far from 3 as from 5.

P. assimilans Wlk.

1855—Wlk., C. B. Mus., Lep. Het., III., 630, *Phragmatobia.*

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 536, *Phragmatobia.*

1862—Morris, Synopsis, Supplt., 346, *Phragmatobia.*

1863—Saund., Syn. Can. Arct., 23, *Phragmatobia.*

1864—Pack., Proc. Ent. Soc., Phil., III., 122, =*rubricosa.*

1889—Slosson, Ent. Amer., V., 85, *an sp. dist. rubricosa.*

Habitat—New Hampshire.

This species—if species it is—has languished among the synonyms, ever since Dr. Packard referred it there in 1864. A specimen taken in 1888 by Mrs. Slosson seems to justify its claim to recognition as a species, and it is so recognized here.

P. rubricosa Harris.

1841—Harris, Rept. Ins. Mass. ... *Arctia.*
1852—Bdv., Lep. Cal. ... Fr.), 49, *Arctia.*
1860—Clem., Proc. A... , XII., 541, =*Crocota rubicundaria.*
1862—Harris, Inj. Ins., ...*rctia.*
1862—Morris, Synopsis ...*Arctia.*
1863—Saund., Syn. Can. ...*ragmatobia.*
1864—Pack., Proc. Ent ...I., 122, *Phragmatobia.*
1883—Edw.*, Papilio, ...*gmatobia.*
1887—Edw.*, Ent. Am... *Phragmatobia.*

fuliginosa ‡ Auct.

1852—Bdv., Lep. Cal. (Ann. Soc. Ent. Fr.), 40, *Arctia.*
1855—Wlk., C. B. Mus., Lep. Het., III., 628, *Phragmatobia.*
1860—Clem., Proc. Acad. Nat. Sci., Phil., XII., 539, *Phragmatobia.*
1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 71, *pr. syn.*
Habitat—Mass., New York, Maine, California, Canada.

It is not admitted by some of our old collectors that *rubricosa* refers to a form really distinct from the European *fuliginosa*. Superficially they undoubtedly resemble each other very closely; but how nearly they will agree when closely compared is another question.

P. dubia Wlk.

1856—Wlk., C. B. Mus., Lep., Het., III., 682, *Cycnia.*
1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 72, *Phragmatobia.*
Habitat—H. B. Terr.

This species has dropped out of our list; but I cannot find that it has been referred as a synonym anywhere. Messrs. Grote and Robinson in their notes (supr. cit.) say: "Wings semitranslucent, brown or mouse color; veins on both wings whitish above; eyes margined narrowly with white; legs shaded with whitish outwardly; abdomen (greasy in the specimen) with three rows of brown spots." There should be no difficulty in identifying this species should it turn up.

(To be continued.)

FOOD PLANT OF MELITÆA TAYLORI, EDW.

Having been asked by Mr. Jas. Fletcher, of Ottawa, to look for the larva of *M. Taylori*, with the purpose of discovering its food plant, &c., it was with much pleasure that I accepted the commission, and now have the gratification to inform you of my success.

I began searching on March 10th, but found everything very backward, owing to the severe winter experienced on this island. Being determined, however, not to miss an opportunity of succeeding, I continued making a close examination of the declivities of the coast at Beacon Hill (thinking it probable that the larvæ had not reached the top of the bluff before hibernating); but after several attempts to locate it, I turned my attention on March 30th to the level land above the cliff, and was rewarded by finding it feeding in numbers on the Rib-wort Plantain *(Plantago lanceolata, L.)*

One peculiar fact I must mention of *M. Taylori* is that the larvæ evidently avoided the old plants, and fed solely on the younger ones, instinctively knowing, perhaps, that they would be less exposed to the attacks of their natural enemies, as the young plants were mostly hidden by the dead grass of last year's growth; however, when the first was found it was an easy matter to follow them up, with the result of capturing about two dozen in half an hour.

They varied considerably in size, some being 6 lines, while most of them were 10 lines in length. I found a cast-off skin showing that they had moulted since "feeding up" this spring; and also that had I looked in the right place a few days sooner I should, without a doubt, have found them. They generally feed singly, but as their food plant grows in large patches it was possible to collect a dozen or more without changing one's position.

They occur all along the coast immediately fronting Beacon Hill, and I have found them a mile away from where they were plentiful; but, in that case, they were very few and far between, although I have collected several dozen during the few hours I could spare from business. They are day feeders, and naturally very slow in their movements.

The following table gives dates of capture with result:—

March 30 took 23 in ½ hour.
" 31 " 37 " 1 "
April 2 " 25 " 1 "

April 6 took 11 in 2 hours.
" 11 & 12—heavy snow storm.
" 14 took 5 in 1 hour.
" 17 " 1 " 1 "

The larvæ are doing well in the breeding cage, and at some future time I shall be glad to submit my observations as to habits while in captivity. Meanwhile am pleas[illegible] the above facts.

W. H. DAN[illegible] ent Street, Victoria, B. C.

ARGIOPE RIPARIA AND [illegible]TE ICHNEUMON ARANEARUM, AND IT[illegible] A CHALCID FLY.

BY FREDERIC[illegible] NEW YORK.

The nests of *Argiope ripa[illegible]* ally abundant last autumn in the neighborhood of this city. [illegible]preceding summer this gayly colored, but atrocious looking [illegible]e seen stationed in the centre of its well formed geomet[illegible]rly all of the low shrubbery in the uncultivated portion of Central Park. Merciless to every insect caught in her web, her household is nevertheless oftentimes greatly reduced, if not altogether destroyed by *Ichneumon aranearum*, a fearless and victorious enemy. Among a large number of nests collected last autumn, those obtained in the latter part of September and as late as the 10th of October contained ova: a single cocoon possessing by actual count 1,277 eggs; those found later in October, and as late as November 3rd, contained young spiders. Only a few of those collected in October had suffered parasitic attack, but the greater number of such as were gathered later in the autumn, contained the larvæ of *Ichneumon aranearum* feeding upon the spiders, or else spun up in their cocoons sometimes to the number of forty. May we not infer from these facts that the parasite deposits her eggs in the nest of Argiope after the eggs of the latter have hatched, or at least, whatever may be the time of depositure, the larva of the parasite feeds upon the spiders?

In examining the cocoons of this Ichneumon an interesting exhibit of secondary parasitism was revealed. In several of the nests of Argiope containing each some thirty cocoons of the Ichneumon, I found that each larval inhabitant was being devoured by from eight to ten larvæ of a Chalcid fly.

"Great fleas and little fleas have smaller fleas to bite 'em,
The smaller fleas have lesser fleas, so on ad infinitum."

CASES OF LONG PUPAL PERIODS AMONG LEPIDOPTERA.

BY R. R. ROWLEY, CURRYVILLE, MO.

In May, 1888, I received from Mr. W. H. Edwards, of Coalburgh, two larvæ of *Anthocharis genutia* which were feeding on pepper grass. On the 22nd (May), both larvæ pupated, having suspended two days before.

As the imagoes did not appear in a reasonable length of time, I communicated the fact to Mr. Edwards, and he informed me they would remain chrysalids till the next May. The summer of 1889 came and went and still my little *Genutia* pupæ slept on and entered upon the second year of their fast. I then learned of the tendency in the genus *Anthocharis* to remain two years in the chrysalis state.

The pupæ were kept through the past two winters in a closet adjoining a warm room, and the first imago, a beautiful male, appeared March 7th, 1890, the other, a female, five days later (12th), after a pupal period of nearly twenty-two months.

In a recent letter from Mr. Edwards, I was informed that the Californian species of *Anthocharis* often remain two years as chrysalids, but he does not state that he has ever known a *Genutia* pupa to go so long.

Another case.—On the 13th of February, 1888, I received four cocoons of *Callosamia angulifera* from Miss E. L. Morton, of Newburgh, N. Y. These cocoons were spun in the mid-summer of 1887. Three of them produced imagoes the following May, but the fourth remained over till the 19th of the next April (1889), having passed twenty-one or twenty-two months in the pupal state. I have had pupæ of *Triptogon modesta*, *Philampelus pandorus*, *Citheronia regalis* and *Eacles imperialis* to fail to give imagoes in the spring, living through the summer, and lingering even till early autumn before death overtook them, but never knew one to survive till the second summer.

NOTES.

A RARE BUTTERFLY.—We learn from the Ottawa Naturalist that five specimens of *Erebia discoidalis* Kirby, one of the rarest in the Canadian fauna, were taken by Mr. John D. Evans, at Sudbury, Ontario, on the 12th May last. The perfect insect is figured and described in Edwards "Butterflies of North America," 3rd Series, Part VII.

TWO INTERESTING MONSTROSITIES.

BY W. HAGUE HARRINGTON, OTTAWA.

Many minor malformations of wings, elytra, etc., have been observed in examining insects, but recently I have met with two monstrosities which seem worthy of record. The first insect is a ♀ *Fœnus tarsitorius* Say., given to me by my frie[illegible]ard, and captured by him on 24th June, 1885. In this sp[illegible]posterior tibia becomes trifid about one-fourth of its length[illegible] the side branches diverging at an angle of about 30°. T[illegible]ns are symmetrical, of nearly equal size (but slightly smal[illegible]bia of the opposite leg), and bearing the terminal spurs, [illegible]e tarsi issuing from them are perfect in every particular of [illegible] The femur is swollen and gives an impression of three [illegible]hile the trochanter and coxa are also enlarged.

The second specimen was [illegible] days ago while I was putting sex labels on some Carabidæ, and is a ♀ *Pterostichus lucublandus* Say. In this insect only the last joint of the left middle tarsus is in triplicate, and while the parts are equal in size to one another, they are individually under the normal size. The fourth joint is widened (like three small ones joined laterally), while the remaining articles are somewhat shortened and thickened. The tibia is also slightly modified; the spines being irregular, and one of the terminal spurs flattened and bifid.

CORRESPONDENCE.

HEPIALUS QUADRIGUTTATUS.

Dear Sir: In a letter to me, dated October 7, 1864, the late Mr. Francis Walker wrote as follows: "Your *quadriguttatus* is, as you suppose, identical with my *H. argenteomaculatus* var." I have myself no doubt that these two Hepiali are distinct species. In Agassiz's Lake Superior, Harris gives *quadriguttatus* as the same as the eastern *argenteomaculatus*, which latter Mr. Mead took in the Catskills, N. Y.

A. R. GROTE, Bremen, Germany.

Mailed June 4th.

The Canadian Entomologist.

VOL. XXII. LONDON, JULY, 1890. No. 7.

APHIDIUS GRANARIAPHIS, N. SP.

BY PROF. A. J. COOK, AGRICULTURAL COLLEGE, MICHIGAN.

Black above, yellowish brown beneath. The antennæ are black, the front, mouth parts and legs yellowish brown. Rarely the femora and tarsi are dusky, and the ventral surface quite dark. Very rarely the dorsal surface is brownish, except the pedicel and tip. The occiput or collar is brown. The antennæ are sixteen-jointed in the female, and seventeen in the male, and are cylindrical, recurved, and thickly set with short, light colored hairs. The first two joints are shorter and larger than the others; the succeeding joints are cylindrical, close together, and equal in length, except the last, which is longer and conical. The abdomen is lanceolate, and all the segments are freely moveable on each other, so it can be easily bent under the thorax. The venation of the wings—see figure—is simple, and the first discoidal cell incomplete. We know from the simple venation of the wings that this is a Braconid. It belongs to the genus Aphidius, as the first discoidal cell is incomplete, the abdomen lanceolate, the antennæ sixteen or seventeen-jointed, and the ventral valves in the female simple. It is 2½ mm. (1-10 in.) long.

Fig. 3.

This species differs from *Aphidius avenaphis* Fitch, as that species has nineteen or twenty joints to the antennæ, is honey yellow where this is brown, and the first two joints of the antennæ, the pedicel of the abdomen, and a spot on the suture between the first and second joints of the abdomen are honey yellow and not black as in Granariaphis. The joints of the antennæ are also less pedicelated, or closer together than in the Avenaphis.

This species is interesting from the fact that it was the principal agent in exterminating the countless millions of grain Aphides last season—1889—in Michigan and adjacent States. While Aphidius avenaphis and other enemies, like Syrphus flies, Coccinnelids and Chrysopa fly larvæ were

numerous and very active. Yet, by far the greater part of the louse destruction here was accomplished by this new species—Aphidius granariaphis. June 30th.—The heads of wheat were thronged with healthy vigorous lice, with but few of the light colored rounded parasitized lice—see figures. Te[illegible] lice were nearly gone, [illegible]tized ones were largely [illegible] Rapidly as the lice i[illegible]em to be no match in this respect for th[illegible]

Fig. 4.

Fig. 5.

I think the grain lice A[illegible]hora) avenæ destroyed at least one-third of the wheat [illegible]gan last year, and greatly injured the balance of the crop. [illegible] been for these parasites we should have had, I think, no cr[illegible]

THE BUTTERFLIES OF LAGGAN, N. W. T.; ACCOUNT OF CERTAIN SPECIES INHABITING THE ROCKY MOUNTAINS IN LATITUDE 51° 25′.

BY THOMAS E. BEAN, LAGGAN, ALBERTA.

(Continued from page 99.)

DEFINITE MARKS OF THE ♀.—Observation of 62 caught specimens enables me to supplement, in some degree, Mr. Strecker's description. The smallest measures 46 mm., equal to 1.8 inch. The largest is 58.5 mm., or 2.3 inches. The average expanse of the 62 is 52.5 mm., or 2.07 inches. The cell spot above primary is larger than in the males, and has never that semi-obsolete appearance which it presents in some of the males; it varies from a small but definite spot of .5 mm. in diameter to a spot of 1.5 mm., is usually sub-rotund, sometimes sub-linear, and is frequently centered with yellow in moderate degree. On under side hind wing the dark nucleus or "patch" of costa is lacking in all, and the submarginal series of dark spots beneath both wings is found to be plainly presented only in three specimens, with slight traces in fifteen others. *Elis* ♀ varies greatly as to condition of border above primary; a few of my specimens have a completed dark border, much as in an average *Hecla*, with the yellow spots small and entirely enclosed. These, however, are extreme instances. At the opposite extreme are specimens

with only the outer side of the border formed, the inner side lacking, but with the row of yellow spots tolerably conspicuous in contrast to the orange ground of the disk. Between these two extremes occur numerous intermediate degrees. The most qualitative distinction of the fore-wing border is that the yellow spots are in general nearly of equal size in the same individual, and especially that the spot at anterior median interspace is usually almost as large as the others; this is the spot which in most forms of *Colias* is usually much smaller than the adjoining spots, and which tends to become obsolete in proportion as the border is more completely developed.

The special type of ♀ Mr. Strecker drew his description from, with seven yellow spots in fore-wing border, is not the more common variation. Usually the two spots near apex are obsolete; an occasional specimen, however, with all the seven spots neatly defined, attests the accuracy of the printed description.

Mr. Strecker also describes an "Albinous ♀ form" of *Elis*, stating that about six of the albinous and nine of the orange form were taken by Capt. Geddes. This proportion of six albino to nine orange, indicates that the "albinous ♀" was based on an error of identification. In the course of several summers' collecting, and also in breeding *Elis* pretty freely from the egg, nothing resembling an albino has been found, while I have seen *ninety* orange ♀s. The ♀ of another species must have been mistaken by Mr. Strecker for a white form of *Elis*. In the district occupied by *Elis* occurs a *colias* rather less frequent, the ♀ usually nearly white, but with a variety still more rare which is a bright clear yellow. It seems likely this white *Colias*, about size of a small *Elis*, may have been the original of the supposed "white *Elis*." The status of this form is somewhat in doubt. It is near to *Pelidne* and *Scudderi*, as its ♂ sufficiently demonstrates, and of course not specially close to *Elis;* its ♀, however, has some resemblance to *Elis* ♀.

One important character of *Elis* remains to be mentioned, which is, that the ♂ is characterized by the presence of the so-called "glandular space" on upper surface of hind wing on costa near base of wing. This structure appears, under moderate enlargement, as a dense cluster of much tilted scales of special form. Its function (if it has one) is probably mechanical rather than physiological. So far as the *Colias* forms are concerned, it is found especially, if not exclusively, in the higher forms, and

wanting in the more primitive, being apparently a modern improvement adapted to some purpose of mechanical utility and developed only at an advanced stage of Coliad progress. Perchance 'tis a refinement in the mechanism of flight, or mayhap some new sort of musical implement, dispensing ultimate atoms of harmony inaccessible to our coarse sense as the "music of the spheres." Of the North American forms of *Colias* only three beside *Elis* are pos culiar apparatus. These are *Meadii*, *Cæsonia* and *Eurydi* ession of this character brings them into very good society prising such fine species as *Lesbia*, *Aurora*, *Vautieri*, *Fielan* tra, in all of which I have examined this structure, as also in nd *Myrmidone*. In *Elis* it appears in all the males I have obt ether bred or caught. This "glandular space" is not pecu I have noticed it in several species of *Catopsilia*, among , *Trite* and *Pyranthe*. In *Gonopteryx clorinde* ♂ the structure ell developed, being in the specimen I examined 17 mm. long, and m. broad in the middle; the colour pale brown. In *Colias elis* the "glandular space" varies from a pale—slightly greenish—yellow to a bright orange.

The foregoing parts of this description, relating to the size and proportions of the butterfly, the breadth of the dark borders, and the size of the several spots and marks on the wings, have been taken from captured butterflies, because bred specimens seldom present the natural averages, but instead exhibit differentiations constituting either type retardation or race progress resulting from and proportioned to the conditions under which they are reared; conditions usually diverse from those of nature. It will not be necessary to adhere to this discrimination in describing the colors and the minute details, and these can more profitably be derived from observation of the bred specimens, where they are displayed in a perfection almost impossible to find intact in flown specimens.

The material of *Elis* bred during three seasons, 1887 to 1889 inclusive, consists of three families *ex ovo*, and four butterflies matured from larvæ found wild—altogether 37 ♂ and 28♀, not to mention a lot of parasites from one of the estray larvæ. These bred specimens mostly show a departure from the average type developed under ordinary out-of-doors conditions. In general this diversion is a progress, an advance of type, a presentation of the ideal instead of the practical *Elis*. In natural conditions *Elis* is subject to somewhat severe limitations. The caterpillar

issues from the egg early in August in average seasons, and its term of hibernation, beginning soon after the middle of August, continues until approximately the beginning of May, so that ordinarily hibernation lasts somewhat more than eight months. Emerging from its winter shelter early in May, the juvenile larva re-enters active life, still a literal infant though over eight months old*.

So chilly are the May nights, and many of its days also, that more than half this active period of the larva must be passed in a state scarcely different from actual hybernation. The conditions of life are doubtless somewhat restrictive, and a removal of these disabilities, by rearing the caterpillars in a warm house, is like an introduction into the tropics.

The result of this culture in an improved climate, other circumstances being favorable, is a notable progress of type, an outcome of butterflies definitely in advance of the ordinary averages.

One of the bred families illustrates well this immediate improvement of type. This lot comprises nine ♂s and ten ♀s, and is a natural family from eggs of one ♀. The increased size of these specimens, as compared with the caught lot, is decisive. The twenty-nine caught ♂s average 51 1-5 mm.; the nine ♂s of this family show an average expanse of 53⅔ mm. Only one of the ♂s of this family expands less than the average of the caught ♂s, each of the remaining eight exceeding that average. The ten ♀s average 57½ mm., against 52½ mm., as the average measure of the 62 caught ♀s; indeed, each of the ten ♀s of this brood is decidedly beyond the average of the caught ♀s, none being under 55½ mm. One of the ♀s, measuring sixty mm., is slightly over 2.36 inches, is the largest *Elis* in my series. These nineteen specimens are as much superior to the caught material, in average of pattern elaboration, as in size. At a first general view they might almost suggest the idea of a distinct species, so superior are they as a body to the general mass of the caught set. But the difference would become intelligible to any careful observer, on inspection, as a simple advance of one set beyond the average development of the other; a difference in degree, not a change in method. This distinction between quantitative and qualitative differences is the vital point in

* I hope none of my younger readers entertain the absurd mediæval superstition that hibernating caterpillars pass the winter in a *frozen condition*. In successful hibernation they do not get near to such a condition; but if they do absolutely freeze, then are they undone caterpillars. Valkyria gives them sleep, unmixed with dreams, and they wake in Valhalla.

estimating the status of closely related forms. With fully representative material of any two forms to compare, the pattern on the wings tells the story, if the observer can read in the butterfly alphabet. The errors of interpretation come chiefly from the primary fault of mistaking a contrast between less and more for a diversity of like from unlike, or the reverse. In frequent comparisons of *Elis* and *Meadii*, my chief effort has been to ascertain the nature of the [illegible]en them, and my resulting impression is that *Elis* is a [illegible]ear as it is to *Meadii*. I do not find an overlap of clo[illegible]cimens uniting them, and the two forms appear to have a [illegible]se plan of pattern, a somewhat dissimilar method of variation [illegible]hat they are travelling different roads. They are, I take it, [illegible] different in kind, not merely in degree. In comparing the [illegible]f the family above mentioned, with the set of caught *El*[illegible] difference is one which need not be misread, even were [illegible]es of origin unknown. It is a difference large in amount, [illegible]ying alienation. The overlap between the two series consists chiefly of a small proportion of males; several of the most finely developed of the caught set being about of the same rank as several of the least developed males in the bred family. Among all the caught females only one compares in size and fine development with the average of the ten females of this family. Evidently, in this signal advance in race character, the females showed more tendency to depart from type than the males. All the females in this family except one, and more than half the males, far surpass the average of caught set as to breadth of dark borders, and it is a genuine progress, entirely free from that erratic over-development of dark markings often occurring in bred specimens; in these specimens the effect is completely harmonious and symmetrical. In this family there are two colors, both of males and females. Four of the males are yellow-orange, the other five bright red-orange, one of them very fiery orange. Eight females are of the red shade, several being almost of as intense a shade as the most brilliant male; the remaining two are yellow, not so clear and light as the yellow-orange males, but slightly tinged with ochre. The reddest males and females are unlike any *Meadii* in my collection; clearer red than any, and lacking the burned-brick tinge of one very red female *Meadii*. Only two, both females, of the caught *Elis*, are quite of this pure red-orange hue. The caught *Elis* do not specially differ from *Meadii* in the color of disk above primary, and are in general somewhat tinged with ochre; one female is

unique in color, being greenish-yellow, but is not otherwise variant from usual form.

Another family consisting of twenty-five ♂s and thirteen ♀s, from eggs laid by one female, scarcely, if at all, surpasses the averages of the caught material as to expanse. The twenty-five ♂s show an average of only 50½ mm., while the caught males average 51 1-5 mm. The thirteen ♀s average slightly larger than the caught females, 53 mm. against 52½ mm. As to pattern, the females present a rather more perfected type than the out-door average, but the males are scarcely equal to the natural average.

The relation found in these two bred families between the numerical proportion of the sexes and the degree of type development, lends some support to the hypothesis that favorable conditions during larval growth tend to a greater production of females, while less favorable conditions produce an increased outcome of males. The proportion of males to females in these two broods is in great contrast. The brood which shows such improved averages contains slightly more than an even share of females; and the family averaging scarcely up to nature's mean level contains a large overplus of males.

Additional to the direct evidence derived from inspection of the butterfly, there are several circumstances which add somewhat to the probability that *Elis* is a good species. Of some little weight, perhaps, is the argument from geographical distribution, that so far as known there is a great gap of country between the district of the form *Elis*, and the territory in which dwells *Meadii* proper. Should later discovery be made of *Elis* considerably further south, or of *Meadii* much more to the north than at present known, the probability of their distinctness would be somewhat lessened. Another and better argument is the inference from relative altitude. *Meadii* is normally an alpine butterfly, *Elis* is subalpine. All accounts agree that *Meadii* lives above timber, though like other alpine habitants, it may in peculiar circumstances make excursions to a lower level. Just such an incident may have originated *Elis*. One needs not an india-rubber imagination to suppose that somewhere in its mountain line of territory, under specially favoring conditions, *Meadii* may have established a colony below timber line. That accomplished, and the feeble colony proving able to maintain itself in the changed conditions, all the elements of the case would combine to speedily separate the new from the old, in kind. Perhaps hardly in any other way could

a distinct species be so rapidly evolved. The ties between the old and the new forms would either be immediately and permanently sundered, or at least greatly enfeebled, as the only means by which these ties of consanguinity could be preserved would be in recurrence of such unusual incursions as that by which the colony had at first been established. The direct influence of the new conditions would be especially effective in producing modification, beca of conditions would be an unusually great one. Howe onjecture. As facts, we know that *Meadii* lives above tir at a great distance to the north, below timber; and that they gh not broadly. They are not known to live next door to eac iere. The geographical relations of *Elis* to *Meadii* may prove ng and important than the question as to the exact biologica d the name of *Elis* prove to be "Dennis," it is but one more etc., stand upon end with the rest of the weird monuments up o fountain; but, in either event, one would like to know just why *Elis* and *Meadii* live at different relative altitudes.

The nature of the difference in the imago between *Elis* and *Meadii* is the chief reason for considering them distinct. At first sight, I did not expect *Elis* would prove distinct from *Meadii*. After obtaining gradually an ample material of *Elis*, and becoming quite familiar with its mode of variation, such differences between *Elis* and *Meadii* became evident, that I was obliged to consider the two forms as probably distinct. By the kindness of Mr. David Bruce, I have lately obtained an additional fine series of *Meadii*, and after repeated comparisons find my previous impression strengthened. I suppose that a new species of butterfly may be considered inaugurated, so soon as a varying form has acquired a visible diversity in the method of its biological progress, as compared with the method of the proximate species; and that our earliest recognition of this acquired diversity will be by observation of a correlant diversity in the method of the color-pattern of a representative series of the new species, as compared with the method of the proximate species. I think *Elis* has reached this point and that it is a valid species.

Meadii, as such, does not occur at Laggan. My set of six male and eleven female *Meadii* compare with the caught *Elis*, in average size, as follows: *Meadii*, males 47¾ mm., females 48 5-7 mm.; caught *Elis*, males 51 1-5 mm., females 52½ mm.; "fair count and no favour."

ERRATUM.—Page 96, lines 1 and 2, "Mount Temple about eight miles south-west"—for "south-west" read "south-east."

SOME NEW MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

Crocota Rosa, nov. spec.

Expanse .80 of an inch.

Upper surface of fore wings, thorax, collar, upper and front of head and terminal joint of palpi pale yellow-brown or fawn color, the only trace of a discal dot is a little duskiness at the end of the cell. Hind wings red, pale, a little dusky, somewhat rosy tinted. Abdomen concolorous with the hind wings; fringes concolorous with the wings.

Beneath, hind wings concolorous with the upper surface; fore wings more red, uniformly so except that the costa is ochre; legs dusky; abdodomen as above, without marks of any kind; under side of palpi yellowish red; eyes black.

One example from Texas and one from Ohio.

This species is close to *Rubicundaria* but lacks the black terminal border to the hind wings and the black marks on the abdomen. Besides this the fore wings are a little narrower.

Hemaris Brucei, nov. spec.

Expanse 1.55 inches.

Top of head, thorax and basal two joints of abdomen, olive, not very dark, the shoulder tufts yellowish, only a little lighter than the adjacent parts; the third joint black, with the lateral hairs bright pale yellow, the lateral tufts of one and two the same color, and a faint line of the same on the posterior margin of these joints for a short distance above the tufts; joints 4, 5 and 6 bright pale yellow, the last one slightly rusty, the lateral tufts the same; the terminal joint with its tufts, both lateral and central, jet black. Palpi beneath very pale yellow, almost white, above blackish, only a few black hairs laterally; eyes with a circle of white hairs; body beneath black but sparsely covered with yellow hairs, except the terminal joint where the hairs are black. Wings as in the Senta group, the terminal and costal borders dark brown, narrow, somewhat dentate on the inner edge, the most so near posterior angle; the outer two-thirds of the basal patch dark red, a small red apical patch that does not reach the apex, a few olive hairs at the base. Hind wings with the margins dark brown, the inner one sparsely overlaid with olive, a red anal patch. Under side of fore wings with the borders about the same shade as above, the basal portion overlaid with pale yellow, the same scattered well over the costa,

a mere trace of the red on the basal patch, the apical red patch as above. Hind wings with the basal-internal patch overlaid with pale yellow the same as the fore wings, two red stains, one at the anal angle and the other toward the base, the outer border with a slight red tinge, but no more so than above. Antennæ black.

One male from Colorado, collected by David Bruce, and dedicated to him in the name.

Platycerura Gigantea, n.

Expanse of wings 2.25 in

Head, thorax and abdomen l[illegible]k gray, much darker than its ally *Furcilla*, the head and colla[illegible] mixture of brown scales, the abdomen also mixed with br[illegible]he lateral semi-tufts and the terminal joint. The fore wing[illegible] half line and three transverse lines as in *Furcilla*, the second re[illegible]g the transverse shade of the Noctuidæ, all black; the t. a. lin[illegible]ot quite so much angled on median vein as on *Furcilla*, the line [illegible]; the shade line or second a little more wavy, curving outward on median vein and outward again on submedian, not touching the t. p. line but more separated from it than in *Furcilla;* reniform a black slightly curved mark, shaded a little outwardly; t. p. line takes the same course as in its ally, but not bent inward quite so much below the cell, bordered externally with a very slight pale shade; s. t. line a very faint pale shade taking the same course as in *Furcilla*, and scarcely noticeable only for the slight internal shading of darker gray, this shading more prominent in its anterior third. The wing is almost a uniform gray, except the black transverse lines. Hind wings sordid white, the veins and the internal margin smoky, the costal margin sprinkled with dark scales. Fringes gray, checkered at the end of the veins, the fore wings only faintly so. Under side pale gray, the transverse lines of the fore wings subobsolete, only distinct as black spots on the costa, but the t. a. line and the shading in connection with the s. t. line crossing the wing; hind wings with two black shades extending backward from the costa and a discal spot, the latter showing faintly above. Body below concolorous with the wings. The palpi are short like those of *Furcilla*, the terminal joint blackish; the antennæ with the shaft gray above, the pectinations and all parts below ochre.

One male from Colorado, received from David Bruce. He writes me that he took a half-dozen examples at light. In size this is more nearly

that of a female that I have from Texas that I have called *Furcilla*, but which may possibly be the female of this species. This example expands a little over two inches, the fore wings are a little lighter than the one from Colorado described above, and the t. p. line and the median shade line are united. The hind wings of the Texas specimens are darker than the Colorado, and the fringe of the hind wings is white.

ON THE LISTS OF COLEOPTERA PUBLISHED BY THE GEOLOGICAL SURVEY OF CANADA, 1842–1888.

BY W. HAGUE HARRINGTON, OTTAWA.

During nearly fifty years the Geological Survey of Canada has been engaged in exploration, and since Confederation it has had practically an unlimited field for its operations. The investigation of the fauna and flora of the Dominion, and the formation of a museum of natural history, are included in the plan of its present organization, but its equipment has hitherto permitted but a partial accomplishment of these departments of its work. Geological investigations and collections have largely absorbed the members of the staff, and systematic work outside of these has been chiefly in ethnology, botany and ornithology. In the museum, entomology is as yet represented but poorly, the only order in which there is a creditable collection being the Lepidoptera, of which the diurnals are well shown by the collection purchased from Capt. Geddes. Any collections made by the officers of the Survey have been in addition to their daily duties, and have been, in consequence, neither very numerous or extensive.

The lists of Coleoptera, which are thinly scattered through the Reports of Progress, have, however, a considerable value as having been made in many instances in remote districts, and before the influx of settlers; thereby giving mostly species indigenous to the various localities, and offering good records for the study of distribution. The fact, also, that all but three short recent lists were furnished by LeConte, renders the determinations of additional value and interest.

As the publications of the Survey are inaccessible to very many entomologists, and as their cost, even when obtainable, prevents their purchase merely for the few entomological lists they contain, it is thought that a reproduction in the CANADIAN ENTOMOLOGIST will be appreciated by its readers.

The lists of LeConte's determinations have been collated so as to present a complete catalogue of the species and show the localities where each occurred. The omission of the names of describers (except in lists A. O., L'O., St. L. and N. C.), and occasional clerical or typographical errors have made the identification of some species difficult, and in a few instances so doubtful that they have been allowed to remain as in the original, and will appear in it ogue. The list of the British Columbia species was especia. this respect.

The catalogue, collated fro... lists which follow, contains 900 references to 469 species (inclu... ut a dozen varieties or races), which belong to 216 genera of 40 f... Of these references 300, or exactly one-third, are to 137 spec... *ndelidæ* and *Carabidæ*, while many of the other species in the c... re such as one might expect to be found by collectors whos... uld be largely directed to the ground. The following are the ... ave been collated:—

Report of Progress, 1858, pp. 233–237 and 247–249.

A.O.—Catalogue of Coleoptera, collected by Mr. D'Urban, in the Counties of Argenteuil and Ottawa, in 1858, (99 species named, and following not determined *Gyrinus*, *Dineutes*, *Homalota*, *Tachyporus*, *Philonthus*, *Stenus*, *Epuræa*, *Cis*, *Cistela*, *Nyctobates*, *Apion*, *Tomicus*).

L'O.—List of Coleoptera from L'Original and Grenville, collected by Mr. R. Bell, (34 species).

St. L.—List of Coleoptera, collected by Mr. R. Bell, on the south-east side of the St. Lawrence, from Quebec to Gaspé, and in the Counties of Rimouski, Gaspé and Bonaventure, (69 species, besides *Brachinus*, *Aphodius*, *Tomicus* and *Galeruca*).

Report of Progress, 1875–76, pp. 107–109.

B.C.—List of Coleoptera, collected during the expedition of Mr. Selwyn to British Columbia in 1875, (146 species, besides *Elaphrus*, "probably n. sp., unless described from *Siberia*," *Hydnobius*, *Boletobius*, *Philonthus*, *Melöe*, *Sitones* and undetermined genera). Collection placed in museum of the Natural History Society of Montreal.

Report of Progress, 1878–79, pp. 65, 66c.

N. C.—List of Coleoptera collected by Dr. R. Bell, in 1879, on the Nelson and Churchill Rivers, (37 species and *Gyrinus*).

Report of Progress, 1879–80, pp. 70, 74c.

List of Coleoptera collected in 1880 in Manitoba, and between Lake Winnipeg and Hudson's Bay, (by Dr. R. Bell, in four localities).

Y. F.—York Factory, Hudson's Bay, August and September, (24 species, also *Amara*, *Hydroporus*, "near *Schönherri* of Europe," and *Graphoderes* "to be described by Dr. Sharp").

N. O.—Norway House to Oxford House, July, (39 species, *Anisotoma* and *Graptodera*).

W.—Lower Fort Garry, Manitoba, June and July, (38 species).

C. L.—Cross Lake, Nelson River, July, (35 species and *Amara*).

Report of Progress, 1880–81–82, pp. 29, 39c.

List of Coleoptera collected in 1881 by Dr. Bell and others in the Lake Superior district, and in the Northwest Territories, east of 112th meridian and south of the 60th parallel.

The species given in Lists I. to VII. were collected by Dr. Bell; those in VIII. by Mr. William Isbister, and those in IX.–XI. by Mr. A. S. Cochrane.

S. M.—I. Sault Ste. Marie, between Lakes Huron and Superior, Lat. 46° 31′, Long. 84° 20′, (96 species).

M.—II. Mouth of Michipicoten River, Lake Superior, Lat. 47° 56′, Long. 84° 51′, (9 species).

H. M.—III. Head Waters of the Michipicoten River, Lake Superior, Lat. 48° 30′, Long. 84° 00′, to Lat. 48° 30′, Long. 84° 10′, (28 species).

M. F.—IV. From Missinaibi House, north-east of Lake Superior to Flying Post, Lat. 48° 29′, Long. 83° 35′, to Lat. 48° 02′, Long. 82° 20′, (18 species and two *Graptodera*).

O. K.—V. Oba and Kabinakagami Lakes and Rivers, north-east of Lake Superior, Lat. 48° 30′, Long. 84° 27′, to Lat. 49° 45′, Long. 83° 45′, (43 species).

T. L.—VI. From Thunder Bay to Lake-of-the-Woods, west of Lake Superior, Lat. 48° 25′, Long. 89° 10′, to Lat. 49° 25′, Long. 95° 00′, (23 species).

O.—VII. Oxford House, between Lake Winnipeg and Hudson's Bay, Lat. 54° 53′, Long. 95° 44′, (67 species and *Cryptophagus* and *Graptodera*).

N.—VIII. Nelson ear Churchill River, Lat. 55° 50′, Lon pecies).

C. C.—IX. From C the Nelson River, to Cumberland Ho atchewan, Lat. 54° 40′, Long. 98° 00′, Long. 102° 22′, (19 species).

C. R.—X. From Cumb se to Reindeer Lake, Lat. 54° 00′, Long. 10 at. 58° 30′, Long. 101° 00′, (19 species).

R. A.—XI. From the no Reindeer Lake to the west end of Athabasca Lake, Lat. 58° 30′, Long. 101° 00′, to Lat. 58° 30′, Long. 101° 00′, (Long. 111° 00′ ? 8 species).

Catalogue of the Coleoptera determined for the Geological Survey of Canada by Dr. J. L. LeConte :—

CICINDELIDÆ.

Cicindela longilabris *Say*. A.O., St. L., B.C., S.M., M.
purpurea *Oliv*. S.M., T.L.
var. 10-notata *Say*. B.C.
vulgaris *Say*. A.O., St. L., S.M., H.M.
repanda *Dej*. [baltimorensis *Hbst*.]. A.O., St. L.
var. 12-guttata *Dej*. St. L., B.C., S.M., H.M.

CARABIDÆ.

Trachypachys inermis *Mots*. B.C.
Cychrus nitidicollis *Chev*., *var*. Brevoorti *Lec*. A.O., St. L.
Carabus Mæander *Fisch*., [palustris *Fisch*.] [Lapilayi *Lec*.]. St. L., N.O., C.L., O., N., C.C.
Chamissonis *Fisch*. Y.F., O., N.
tædatus *Fab*. B.C., N.C., Y.F., O., N.
race Agassii *Lec*. W., C.R., R.A.
serratus *Say*. St. L., B.C., C.L.

Calosoma calidum *Fab.* St. L., M.
tepidum *Lec.* B.C.

Elaphrus Clairvillei *Kirby.* B.C.
riparius *Linn.* St. L., O.
race californicus *Mann.* B.C.

Opisthius Richardsoni *Kirby.* B.C.

Notiophilus sibiricus *Mots.* [punctatus *Lec.*]. A.O., C.C.
Hardyi *Puts.* N.O., C.L., O.

Nebria Sahlbergi *Fisch.* B.C., N.C., N.
Mannerheimii *Fisch.* B.C.

Pelophila rudis *Lec.* O.K., N.
Ulkei *Horn.* N.

Nomius pygmæus *Dej.* H.M., O.K.

Bembidium punctatostriatum *Say.* A.O.
carinula *Chd.* [impressum *Fab.*]. A.O., O.K., O.
littorale *Oliv.* [paludosum *Sturm*]. B.C.
erasum *Lec.* [Mannerheimii *Lec.*]. B.C.
dilatatum *Lec.* St. L.
concolor *Kirby* [salebratum *Lec.*]. W.
quadrulum *Lec.* B.C.
planatum *Lec.* B.C.
complanulum *Mann.* B.C.
funereum *Lec.* B.C.
bimaculatum *Kirby.* N.O., C.L., O.
lucidum *Lec.* A.O., St. L., B.C., Y.F.
picipes *Kirby.* T.L.
Grapei *Gyll.* [nitens *Lec.*]. C.L., O.
incrematum *Lec.* B.C.
patruele *Dej.* A.O., B.C.
nigripes *Kirby.* B.C., O.
versicolor *Lec.* B.C.
sulcatum *Lec.* B.C.
connivens *Lec.* B.C.
mutatum *G.* & *H.* [axillare *Lec.*]. B.C., O.
quadrimaculatum *Linn.* C.C.

Patrobus longicornis *Say*. A.O., St. L., S.M.
septentrionis *Dej.* [hyberboreus *Dej.*]. O.K.
rugicollis *Rand.* St. L.
aterrimus *Dej.* B.C.

Pterostichus honestus *Say* [fastidatus *Dej.*]. A.O.
coracinus *Newm.*]. L'O., St. L., H.M., M.F., O.K.
punctatissimus *Ra* ., O.K., O.
lucublandus *Say* (, St. L., W., S.M., T.L.
caudicalis *Say.* *
corvinus *Dej.* St.
scrutator *Lec.* (Lo .O.
orinomum *Leach.* .C., N.C., Y.F., N.O., W., C. L., S.M., H.M. O., N., C.C., C.R.
Luczotii *Dej.* (" var. .O., St. L.
erythropus *Dej.* L'O., St. L., S.M.
patruelis *Dej.* A.O., St. L., T.L.
empetricola *Dej.* N.C.
mandibularis *Kirby.* St. L., C.L., O.

Amara avida *Say.* W.
similis *Kirby* [hæmatopus *Dej.*]. N.C., N.
rufimanus *Kirby* [reflexus *Putz.*]. Y.F.? N.O.
cylindrica *Lec.* N.O., W., C.L., O.
elongata *Lec.* N.
latior *Kirby* [libera *Lec.*]. St. L., T.L.
angustata *Say.* L'O.
pallipes *Kirby.* St. L.
impuncticollis *Say.* L'O., St. L., S.M., O.K., O.
littoralis *Mann.* C.R.
fallax *Lec.* St. L., B.C., W., C.L.
protensa *Putz.* N.O.
erratica *Sturm.* B.C., H.M., T.L., N.
interstitialis *Dej.* St. L., C.L., T.L., O., N.
obesa *Say.* W., S.M.
musculus *Say.* W., N.

(To be continued.)

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 120, Volume xxii.)

Genus ANTARCTIA Hbn.

1816—Hübner, Verzeichniss, 192.
1864—Pack., Proc. Ent. Soc., Phil., III., 122.
1873—Stretch, Zyg. & Bomb., 191.

The head is small and retracted; tongue obsolete, palpi very small and weak; antennæ moderately long, bipectinated in the male, simple in the female: the pectinations are long and extend to the tip; legs short and weak, all the spurs present, but very short: the two pairs of the posterior tibiæ close together. The tarsal claws are as in *Spilosoma*, and, indeed, there is no structural difference between these two genera. *Antarctia* has shorter, broader wings, somewhat longer vestiture, and is not white!

Primaries with 7 to 10 stalked, the branches arising in pairs; 3 to 5 from the end of the median, and about one-half closer to 5 than to 6. Secondaries 6 and 7 together from the end of the sub-costal; 8 rather closer to base than usual; 4 and 5 together from the end of the median, 3 very close to the end.

A. punctata Pack.

1864—Pack., Proc Ent. Soc., Phil., III., 123, *Antarctia.*
1873—Stretch, Zyg. & Bomb., 192. =*vagans.*
1875—Edw., Proc. Cal. Ac. Sci., V., 188, *Antarctia.*
rufula ♀ Bdv.
1855—Bdv., Ann. Soc. Ent. Fr., 1855, Bull., p. 32, *Nemeophila.*
1868—Grt. & Rob., Cat. Lep. N. A., *Nemeophila.*
1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 79 *Arctia.*
1870—Grt. & Rob, Tr. Am. Ent. Soc., III., 175, *pr. syn.*
1875—Edw., Proc. Cal. Ac. Sci., V., 367, *pr. syn.*
1881—Neum., Papilio, I., 80, *pr. syn.*
var. *proba* Hy. Edw.
1881—Edw., Papilio, I., 39, *Antarctia.*
Habitat—Sierra Nev., California, Oregon.

A. rubra Neum.

1881—Neum., Papilio, I., 79, *Antarctia.*
1881—Butl., Ann. Mag. N. H., ser. 5, VIII., 311, *Antarctia.*
Habitat—Oregon, California.

A. vagans Bdv.

1852—Bdv.*, Lep. Cal. (r., 2 ser. X., 322), 50, *Arctia.*
1856—Wlk., C. B. Mus., , 630, *Phragmatobia.*
1860—Clem., Pr. Ac. N. 336, *Phragmatobia.*
1862—Morris, Synopsis, ; *obia.*
1864—Pack., Proc. Ent. ' 122, *Phragmatobia.*
1868—Grt. & Rob., Cat. *Phragmatobia.*
1869—Bdv., Lep. Calif. (, Belg., XII.), 79, *Arctia.*
1873—Stretch, Zyg. & B 'III., ff. 8–12, *Antarctia.*
pteridis Hy. Edw.
1875—Edw., Proc. Cal. A , *Antarctia.*
1875—Edw., Proc. Cal. Ac. Sci., V., 367, *pr. syn.*
var. *rufula* Bdv.
1852—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 80, *Arctia.*
1873—Stretch, Zyg. & Bomb., 192, *pr. syn.*
1881—Neum., Papilio, I., 79, *pr. var.*
Habitat—California, Vancouver.
Food plant—*Lupin* (Stretch).

A. walsinghami Butl.

1881—Butl., Ann. & Mag. N. H., ser. 5, VIII., 311, *Antarctia.*
Habitat—Oregon.

The synonymy in this genus is far from settled. There are probably fewer species than are given here. At all events, I do not see why *rufula* must not replace *punctata* Pack., for, though the male was a mere variety of *vagans*, the female referred to a good species, and the name cannot be dropped, because in part a synonym. I have not made the change here, but content myself with calling attention to the necessity for it.

Genus LEUCARCTIA Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 124.

Head small and retracted; palpi short; tongue short and weak. Antennæ short, pectinated in both sexes, the pectinations in the female

short, but nearly as long as those of the male. Legs short and stout, anterior tibiæ with a short stout spine at either side of tip; middle and posterior tibiæ with minute terminal spurs only. The claws of tarsi are toothed in both sexes.

Primaries with 7 to 10 from a stalk in the order 10, 7, 8, 9; 3 to 5 from end of median, 4 nearer to 5 than to 3.

Secondaries 6 and 7 from same point at end of sub-costal; 8 from sub-costal half way to base; 3 to 5 almost equidistant from end of median.

Moeschler, in 1876, Stett. Ent. Zeit., XXXVII., 297, makes this a synonym of *Spilosoma.*

L. acræa Drury.

1770—Drury, Exot., I., pl. III., f. 2 (♀) and 3 (♂), *Phalæna.*
1793—Fabr., Ent. Syst., III., 1, 451, *Bombyx acria.*
1797—Sm. & Abb *, Ins. Ga., II., 133, pl. 67, *Phalæna acria.*
1816—Hüb., Veizeichniss, 184, *Estigmene.*
1820—Hüb., Samml. Auss. Schmett, II., pl. 404, *Estigmene acria.*
1823—Harris*, Mass. Agr. Repos. & Journ, VII., 323, *Arctia.*
1833—Harris, Cat. Ins. Mass., 591, *Arctia.*
1837—Westw., ed Dru., I., 7, *Spilosoma.*
1841—Duncan*, Nat. Libr., XXXII., 171, pl. 20, ff. 1–3, *Spilosoma.*
1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 53, *Spilosoma.*
1862—Morris*, Synopsis Supplt., 342, *Spilosoma.*
1862—Harris*, Inj. Ins., Flint, ed. 351, f. 169, pl. VI., ff. 9 (♂) and 10 (♀), *Spilosoma.*
1864—Pack., Proc. Ent. Soc., Phil., III., 125, *Leucarctia.*
1869—Bdv., Lep. Calif. (Ann. Soc. Ent., Belg., XII.), 78, *Arctia acria.*
1873—Stretch*, Zyg. & Bomb., 99, pl. 4, ff. 1–3, and pl. 10, f. 6, *Leucarctia.*
1874—Morrison, Psyche, I., 21, *Leucarctia.*
1875—Edw.*, Proc. Cal. Ac. Sci., V., 368, *Leucarctia.*
1883—Weed, Papilio, III., 84, *Leucarctia.*
1883—Grt., Papilio, III., 84, *Leucarctia.*
1883—Stretch, Papilio, III., 141, *Leucarctia.*
1884—Bean*, CAN. ENT., XVI., 66, *Spilosoma.*
1886—Smith, Ent. Amer., II., 79, *Leucarctia.*

pseuderminia Peck.
1823—Peck., Mass. Agr. Rep. & Journ., VII., 328, pl. 1, *Arctia.*
1837—Westw., ed. Drury, I., 7, *pr. syn.*
1855—Wlk., C. B. Mus., Lep. Het., III., 667, *Spilosoma.*
caprotina Drury.
1770—Dru., Exot., I., ...*na.*
1782—Cram., Pap. Exc ...287, f. C, *Phalæna.*
1797—Sm. & Abb., Ins. ...*br. syn.*
1837—Westw., ed. Dru.,
californica Pack.
1864—Pack., Proc. Ent. ..., 125, *Leucarctia.*
1872—Pack., 4th Rept. ... *br. syn.*
packardii Schaupp.
1882—Schaupp, in Che... ...t. Soc., 8, *Spilosoma.*
Habitat—United States and ...
Food plant—Omnivorous.

L. albida Stretch.
1873—Stretch, Zyg. & Bomb., 203, pl. 8, f. 22, *Leucarctia.*
1875—Butler, Cist. Ent., II., 36, *an sp. dist. virginica ?*
1876—Stretch, Rept. Geol. Surv., west 100 merid., V., 798, pl 40, ff. 4 and 5, *Leucarctia.*
Habitat—California.

The *Arctia scuirus* of Boisduval was referred by Grote and Robinson to *acræa*, but is now recognized as referring to *Euchaetes collaris !* The peculiar male characters of the *acræa* have been described by Mr. Morrison, and later figured by myself.

Leucarctia permaculata Pack. is an *Ecpantheria*, and is referred to under that genus. I do not find the species in Mr. Grote's list, but perhaps it may be referred to in some paper which I have not seen.

(To be continued.)

Mailed July 4th.

The Canadian Entomologist.

VOL. XXII. LONDON, AUGUST, 1890. No. 8.

THE NOCTUIDÆ OF EUROPE AND NORTH AMERICA COMPARED.

(Eighth and Last Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Tribe *Catocalini.*

In this tribe the secondaries are oftenest gaily coloured (mostly yellow) and banded, still subordinated to the primaries which show, more or less adequately, the usual Noctuidous ornamentation. The abdomen is rarely tufted. On account of the shape of the primaries, the form of the abdomen, the abdominal tuftings, the pattern of the wings beneath, the approach to *Ophideres*, I regard the genus and species *Euparthenos nubilis*, Ann N. Y. Lyc. Nat. Hist., as entirely distinct from *Catocala* sp. The most important genus is *Catocala*, in Europe with 22, in North America with upwards of 100 species. A division of this genus on the peculiarities of tibial armature (as I have suggested in *Agrotis*) was stated to me as possible several years ago by Mr. Smith, and has more recently been attempted by Mr. Hulst. I must think that his observations need verifying, judging from his published opinions on the value of the forms of *Catocala*, which I have shown to be in a number of instances incorrect. The *Ophiderinæ* and *Toxocampinæ* of my Check List are probably not to be separated from this tribe, in which the anterior ventral feet of the larvæ are more or less incomplete. The genera become gradually broader winged and concolorous as we approach the next tribe.

Tribe *Pheocymini.*

This comprises the *Erebiinæ* of my Check List. The wings are marked by rivulous lines crossing both pair and recalling the Spanner

moths. The tibiæ are variously armed, but become unarmed in the weaker genera, *Homopyralis*, etc., and as we approach the *Deltoidinæ*. In Europe this tribe seems represented only by *Pericyma* and *Zethes*. As we go southward the moths of this tribe become more numerous and we find the largest *Noctuidæ* among them in *Erebus* and *Thysania*. The tribe is tropical and subtr[illegible] of the species are summer migrants from the South, n[illegible] Middle and Eastern States, or Canada.

There remain to be consid[illegible] opical forms which are found in Florida, or accidentally on [illegible] such as *Hexeris enhydris*, *Syllectra erycata* and *Brotis* [illegible] These probably are to be separated as affording distin[illegible] but I cannot at the moment compare their structure wit[illegible] South American allies. The tribe *Pangraptini*, with the [illegible] *ngrapta* and *Phalaenostola*, seems to close the series and lead to t[illegible] toids. The North American genera must be compared here with their tropical allies. This element of our fauna comes from the south, and, as we have seen, is almost wanting in Europe.

Sub-family *Deltoidinæ*.

This sub-family was formerly regarded as belonging to the *Pyralidæ*. In the vernacular the Deltoids are called "Snout Moths," from the long labial palpi. But Herrich-Schæffer showed that in their essential characters they conform to the Noctuid type; they are pyralidiform *Noctuidæ*. The wings are usually pointed at the tips, the colours are gray and dusty, the usual Noctuid ornamentation is hardly to be discerned. The eyes are always naked. They fall into two principal tribes. The character of this sub-family becomes again largely European. As the name "Snout Moths" refers to this sub-family, I have called the *Pyralidæ* by the name of Sparkler Moths.

Tribe *Herminiini*.

The type of this tribe is the European *Herminia tentacularis*, to which our North American *Philometra* is related. The wings are concolorous, marked with continuous lines, reminding us of the *Pheocymini* and the *Geometridæ*. The antennæ are often furnished with sexual nodosities. The species fly in grass upon which the larvæ generally feed.

One of the most variable *Noctuidæ* known to me belongs to this tribe, *Zanclognatha lævigata*. Our species resemble generally the European, but are much more numerous.

Tribe *Hypenini*.

The type of this tribe is the European *Hypena proboscidalis*. The hind wings are unicolorous and subordinate to the primaries, which show the usual Noctuid markings more or less distinctly. The body is sometimes tufted, the brush-like antennæ are simple. In *Bomolocha* the eyes are lashed, but this character has nothing to do with the hairiness or nakedness of the eye itself, which, in the *Deltoidinæ*, so far as I know, is always naked. This nakedness is a general characteristic of the lower moths. I know of only one Geometrid with hairy eyes. The genera in my Check List, down to *Hypenula*, referred to this tribe, should probably be included in the preceding.

Sub-family *Brephinæ*.

The members of this small sub-family group are boreal or sub-boreal in their habitat, and resemble certain *Geometridæ*, inhabiting similar zoological zones, in their hairy body, a more or less marked diurnal flight, and the 16-footed larvæ. The ocelli are wanting, and this character excludes the Californian genus *Annaphila*, which is really related to *Eustrotia (Erastria)*, but has a certain resemblance in colours to this sub-family and the *Catocalini*. Our single species, *Brephos infans*, is found from Labrador to New England. Another form, *Leucobrephos brephoides*, I identified originally from Hudson's Bay. It may be the same with a species described by me from Wisconsin, and, among the figures of Siberian moths which I have examined, is one which, I think, represents a form belonging to this North American genus. Europe has three species of *Brephos* Hübn. (nec. Ochs.). The name *Brephos*, like *Agrotis*, etc., was originally proposed by Hübner. Through neglect and corruption, Hübner's names became credited to other European writers. I have done my best to clear up the generic synonymy by indicating the types in my Buffalo Lists. The student is referred to these for special information on this point.

Although the Owlet moths are quite numerous in the east, yet the Western States of North America seem richer in genera and

species. The different elements among the numerous genera need bringing out, but it has been sufficiently shown here where the general lines of relationship are to be sought. Like the Hawk moths, these too have been redistributed by climatic changes, the most important of which was the Glacial Epoch. We receive a large accession from the south, but the bulk of our *Noctuidæ* show a northern parentage. The common ancestors of certain of the E[illegible] erican Owlet moths of to-day had, at one time, a common [illegible] I have shown the existence of every grade of resemblance [illegible] uishable species like *Scolioptteryx libatrix* and *Dipterygia* [illegible] ough slightly modified forms like *Apatela occidentalis*, *L*[illegible]*a*, *Copimamestra occidenta*, *Agrotis normaniana*, *Lithoph*[illegible] to forms readily distinguishable in all their stages by the [illegible] ident. The mass of species is so great that detailed obse[illegible] ch particular one must await time; but I trust I have laid [illegible] s by which our Owlet moths are to be studied until our information with regard to them is perfected.

Some idea of the preponderance of *Catocalinæ* in North America may be given by the statement that in Europe there are about fifty-six species belonging to about sixteen genera, while in North America there are about two hundred and fifty species belonging to about fifty-six genera. These latter figures may be changed by new observations with us, but hardly diminished. In the *Deltoidinæ* the proportions are more in conformity with the numerical relations in the typical group, the *Noctuinæ*. The reason I have given for this preponderance of the *Catocalinæ*, lies in the physical geography of the continent, the prevailing atmospheric and ocean currents, all of which favor the introduction of southern or tropical lepidopterous forms. And we must consider the *Catocalinæ* as tropical in general character in the same way as we consider the other groups of the *Noctuidæ* as belonging to temperate regions of the earth's surface.

In a general view of the evolution of the Lepidoptera we may conceive it as represented by an inverted and spreading bell of net work, in hanging threads of unequal lengths, branching variously and in different directions, and ever widening in departure and circumference. The depending tips of the threads represent the existing species, all connected with the past, and the task before us is the tracing of the threads, always running here and there together, grouping themselves about thicker strands, converging in the hand of time. The means at our disposal for the un-

ravelling are the characters of existing species in *all* their stages, and the sadly imperfect, almost failing, record of fossil species. To add to the difficulty, the species have been distributed and redistributed, affected by geological changes, modified by differences in temperature, moulded by the winds. It is clearly impossible to arrange existing species in a linear series and thereby express also their probable descent. We can only group them according to natural characters and for purposes of convenience. Undoubtedly our categories, through their characters, correspond vaguely to the general plan of evolution. But the arrangement of our catalogues and collections must remain artificial in the main, conditioned by our own physical limitations. Our mental picture of these insects remains relatively imperfect, but enlarges through new studies and fresh thoughts.

ERRATA ET ADDENDA.—Vol. XXI., p. 123, line 10, for *Noctuidæ* read *Noctuinæ*; id., p. 155, line 30, for *Dasychininæ* read *Dasychirinæ*. The first three North American genera in the list, on p. 157, I refer to the tribe *Bombycoidi*, the rest to the *Apatelini;* the tribal divisions accidentally omitted. Id., p. 189, line 34, for merely read mainly. In connection with my remarks on *Gortyna*, p. 192, I refer to my paper on this genus and *Ochria*, p. 139, written subsequently. Id., p. 229, line 19, insert "apices of the" before "still pointed primaries"; id., p. 230, line 29, for *pyramided* read *pyramidea*; id., p. 230, after *saucia* insert *clandestina*; Vol. XXII., p. 29, line 23, for *Calopharia* read *Calophasia*; id., p. 30, line 2, for form read tribe; id., p. 30, line 9, for slimy read shiny; id., id., line 17, for *Hatney* read *Hatuey;* id., p. 28, line 3, dele "or *Morrisoni*." Dr. Thaxter inclines to consider *sidus* = *vinulenta*, while I sought for it in red forms of *Walkeri*. The latter species is nearer the European *satellitia*, which *tristigmata* also resembles. Without Guenée's type I think no certainty can be obtained. While I think the outlines of a more correct classification of the family are here given, certain points remain to be discussed, such as the separation of *Ingura* as a distinct tribe, while the location of certain genera will be altered when minuter comparisons can be made and the full life history of the species is known. As nature did not produce these creatures in a linear series, one after another, we can only approximately exhibit their relations in our catalogues and collections.

A REPLY TO MR. W. H. EDWARDS.

BY H. J. ELWES, PRESTON, CIRENCESTER, ENGLAND.

I am surprised to see in the May number of the CANADIAN ENTOMOLOGIST a criticism of my paper on "Argynnis" in a style which is not easy to reply to, and which is certainly not justified by the paper itself. Mr. Edwards seems to think that no one has a right to question his opinions on butterflies until the so-called types from which his original descriptions were n[illegible]e practical monopoly which he has lately held in the desc[illegible] species in the United States gives him the position of an [illegible]ccuses me of haste and carelessness, of not having taker[illegible] see what I could easily have seen, and implies that I have [illegible] species I have written about. I will only ask those who m[illegible], to read my paper* in full and not to judge from the åbridg[illegible]ch was published in the March number of *Psyche*. I will also [illegible]er to *Papilio*, Vol III., p. 152. It will there be seen that I have for se[illegible], ears been collecting all available material for the better understanding of a genus which, naturally difficult in itself, has been rendered doubly so by Mr. W. H. Edwards. It will be seen that in 1883 I had publicly, as well as privately, asked him to inform me how I could identify species which had been described by him, often from very imperfect or scanty specimens—sometimes in such inaccessible publications as *Field and Forest*, and usually, if not always, without giving any characters by which the species could be distinguished from its near allies. To these questions I have received no reply. My valued correspondent, Mr. H. Edwards, "whose judgment in doubtful cases Mr. W. H. Edwards relies on above all persons," had kindly sent me a considerable number of the rarer western forms named by himself. Mr. H. Strecker, who certainly has as good an eye for, and as good a judgment of species as almost any one I met in America, sent me many more, and in various ways I had collected all the known so-called species except four, of two of which I had seen the types, so that I have, as I believe, a larger and better series than any one in Europe or in any of the collections I was able to examine in America. I did not therefore write hastily or carelessly, and the numerous queries in my synopsis show how uncertain I still felt of the proper position and specific value of many of

* A copy will be sent, as long as they last, to any Entomologist who will write for it to me at Preston, Cirencester, England.

the western forms. After having repeatedly tried to find in Mr. Edwards's published figures, all of which I have carefully studied, any help in separating these doubtful forms, I had visited and examined the collections of Mr. Holland (who, I was informed, had acquired Mr. Edwards's types), of the Harvard Museum; of Messrs. H. Edwards, Strecker, Neumogen, Hulst, Scudder and Dr. Behr, to all of whom my best thanks are due; after having gone through all the American and European literature and museums, and written to every one from whom I hoped to learn anything, and after having collected personally in Southern and Northern California and the Yellowstone Park, I am told I have no claim to know anything about "Argynnis," as I have seen mostly second or third rate collections. (Where then are the first rate ones that I did not see?)

I am pleased to learn, that whatever Mr. Edwards's opinion of my work may be, it is not shared by all of his countrymen, from three of the most able of whom I have received flattering approvals of my attempt to enable others to understand this genus, and to arrange their collections on a more rational basis. Mr. Edwards implies that I pay no regard to local variation, that I do not allow that locality is any help in deciding the name of a species, and am generally inclined to lump everything that I do not know.

Will he then see how slight a difference is sufficient in my eyes to separate a local variety, as in the case of the Himalayan form of *A. lathonia*, or a local race worthy to be called a species, such as *A. montinus*, and how I have tried to make these slight differences clear to my readers, as in the case of *A. helena*?

Let him do the same with *Chitone*, *Cipris*, *Inornata*, *Hippolyta* and others, and he will find me the most appreciative of his followers.

But when he rambles on in the way he sometimes does, failing to recognize his own species when they are sent to him for name from unexpected localities, as I am told he has done, I can only say that the fact of a butterfly being confined to one station is not enough to separate it specifically unless it has through isolation or climatic influences developed some peculiarity by which it may invariably be recognized as having come from that place. I do not blame him for describing such things twenty years ago, but I say that now, after he has himself proved by breeding the extraordinary amount of variation to which many species are subject, he has no right to expect anyone at once to recognize as a species such a

form as *Argynnis Alberta*, which he has just described from one ♂ and two ♀ sent him by Mr. Bean.

It would be useless for me to reply in detail to his remarks upon particular species, because he will always fall back upon his so-called types, whilst others must rely on his published work, if they can get it, and if not, upon the best materials they can get. No doubt there are many errors in my arrangement which o ter knowledge can clear up. I shall welcome the criticism o will show me where I am wrong, and who has better n g at the truth than I have, but I am quite content to live u rds's aspersions in such good company as that of Dr. Hagen- that Mr. Edwards will think better of us both when he gets

A NEW PSEUD ORPION.

BY NATHAN BANKS, ITHACA, N. Y.

Upon looking over the specimens of this family, which I had collected during the past few years near Ithaca, I discovered a new species of *Chernes*, which may be characterized as follows :—

Chernes pallidus, nov. spec. Length about 2 m.m.; body ovate oblong ; cephalothorax a little broader behind than in front ; finely serrulate on the margin ; body finely granulate and furnished with short, yellowish, clavate hairs. Abdomen pale yellowish ; cephalothorax reddish near anterior end ; palpi a uniform red ; legs yellowish ; no light median line on dorsum. No eyes ; palpi stout, longer than the body ; 3rd joint nearly as long as cephalothorax, and three times as long as 2nd ; 4th a little shorter than 3rd ; hand large and stout, fingers a little curved. Larger than *C. Sanborni* H. and *C. oblongus* Say, the palpi larger and longer, and the legs much stouter than in these species. In *C. Sanborni* H. the 3rd joint of palpi is but twice as long as the 2nd. *C. oblongus* is smooth, not granulate ; one specimen, Ithaca.

The following species are also found near Ithaca : *Chernes Sanborni* H., several specimens ; *Chernes oblongus* Say, more common ; *Chelifer cancroides* L., in houses ; *Chelifer muricatus* Say, one specimen ; *Obisium bruneum* H., several specimens ; *Chthonius pennsylvanicus* H., three specimens.

ON THE LISTS OF COLEOPTERA PUBLISHED BY THE GEOLOGICAL SURVEY OF CANADA, 1842–1888.

BY W. HAGUE HARRINGTON, OTTAWA.

(Continued from page 140, Vol. xxii.)

Diplochila major *Lec.* [Rhembus]. A.O.
Calathus gregarius *Say*. L'O., St. L.
ingratus *Dej*. N.C., C.L., O.K., O., N., R.A.
race confusus *Lec*. B.C.
mollis *Esch.*, *race* lenis *Mann*. B.C.
impunctatus *Say*. St. L.
Platynus maurus *Mots*. [stygicus *Lec.*]. Y.F.
sinuatus *Dej*. A.O., St. L., B.C., C.L., T.L., O.
extensicollis *Say*. St. L,
anchomenoides *Rand*. B.C.
tenuis *Lec*. St. L.
melanarius *Dej*. St. L., B.C., C.L.
affinis *Kirby*. M.F.
metallescens *Lec*. O.K , O.
deceptivus *Lec*. O.K.
cupripennis *Say*. L'O., St. L., W., S.M.
perforatus *Lec*. O.
placidus *Say*. St. L., W.
cupreus *Dej*. W., S.M., C.C.
Bogemanni *Gyll*. [obsoletus *Say*]. A.O., W., S.M., M.F., O., N., C.R.
race strigicollis *Mann*. B.C.
quadripunctatus *DeG*. W., O.
sordens *Kirby*. T.L.
ruficornis *Lec*. N.C., N.
retractus *Lec*. A.O., St. L., B.C., W., O.K.
picipennis *Kirby*. St. L.
lutulentus *Lec*. St. L.
Lebia cyanipennis *Dej*. B.C.
viridis *Say*? A.O.
Metabletus americanus *Dej*. [borealis *Zimm.*]. B.C., N.O.
Cymindis cribricollis *Dej*. [reflexa *Lec.*]. L'O., St. L., B.C., N.O. H.M., O.K., C.R.

Chlænius sericeus *Forst.* L'O., St. L., S.M.
leucoscelis *Chev.* [chlorophanus *Dej.*]. St. L.
tricolor *Dej.* L'O., St. L.
pennsylvanicus *Say.* O.K.
impunctifrons *Say.* A.O.
Agonoderus pallipes *Fab.* W.
Harpalus amputatus .
viridiæneus *Bea.*
pennsylvanicus *L* S.M.
megacephalus *Le.*
pleuriticus *Kirby.* L., S.M., O., N.
herbivagus *Say.* I , S.M.
cautus *Dej.* B.C
rufimanus *Lec.* S
oblitus *Lec.* B.C.
basilaris *Kirby.* B.C.
ruficornis (misprint ?). B.C.
Stenolophus conjunctus *Say.* B.C., S.M.
Bradycellus cognatus *Gyll.* O.K.
rupestris *Say.* W.
Tachycellus nigrinus *Dej.* [Bradycellus]. T.L.
Anisodactylus piceus *Mén.* B.C.
rusticus *Dej.* L'O.
californicus *Dej.* [confusus *Lec.*]. B.C.
Harrisii *Lec.* L'O., St. L.
baltimorensis *Say.* L'O., S.M.

HALIPLIDÆ.

Haliplus cribrarius *Lec.* A.O.
ruficollis *DeG.* (immaculaticollis *Harr.*). A.O.

DYTISCIDÆ.

Laccophilus proximus *Say.* C.L.
Cœlambus inæqualis *Fab.* [Hydroporus]. H.M.
ovoideus *Lec.* [Hydroporus]. Y.F.
impressopunctatus *Sch.* [Hydroporus]. Y.F.

Deronectes depressus *Fab.* [Hydroporus rotundatus *Lec.*]. O.K.
griseostriatus *DeG.* [Hydroporus]. B.C.
Hydroporus proximus *Aubé.* A.O.
sericeus *Lec.* H.M.
alpinus *Payk.* O.
tartaricus *Lec.* Y.F.
tristis *Payk.* [subtonsus *Lec.*]. Y.F.
modestus *Aubé.* Y.F.
Ilybius confusus *Aubé.* H.M., N.
Coptotomus interrogatus *Fab.* A.O.
Agabus parallelus *Lec.* O.K.
seriatus *Say.* A.O., St.L.
punctulatus *Aubé.* N.
anthracinus *Mann.* [scapularis *Mann.*]. B.C.
infuscatus *Aubé.* B.C.
Erichsoni *G. & H.* [nigroæneus *Er.*] [lutosus *Cr.*]. B.C., N.C., O.K.
dissimilis *Sahl.* [Gaurodytes longulus *Lec.*]. Y.F.
Rhantus binotatus *Harr.* [Colymbetes]. B.C., S.M.
tostus *Lec.* [Colymbetes]. B.C.
Colymbetes sculptilis *Harr.* [Cymatopterus]. B.C., M., H.M., O.K., N.
Dytiscus circumcinctus *Ahr.* [anxius *Mann.*]. B.C., N.C.
dauricus *Gebl.* [confluens *Say*]. St.L., N.C., M.F., O., N.
Harrisii *Kirby.* H.M.
lapponicus [*Gyll?*]. O.K.
Acilius semisulcatus *Aubé.* H.M.
fraternus *Harr.* L'O.

GYRINIDÆ.

Gyrinus confinis *Lec.* M.F.
limbatus *Say.* H.M.
ventralis *Kirby.* B.C., O., C.C.
affinis *Aubé.* M.F.
pectoralis *Lec.* H.M.
borealis *Aubé.* H.M., N.
picipes *Aubé.* B.C.
Dineutes emarginatus *Say.* O.K.

HYDROPHILIDÆ.

Helophorus lineatus *Say*. Y.F.
Berosus striatus *Say*. W.
Philhydrus cinctus *Say*. A.O.
perplexus *Lec*. Y.F., T.L.
Hydrobius fuscipes *Linn*

Necrophorus Sayi *Lap*. [lu A.O.
marginatus *Fab*. [Sil
vespilloides *Hbst*. [ ]. A.O., M., O., N.
tomentosus *Web*. [v St.L.
Silpha surinamensis *Fab*.
lapponica *Hbst*. St. N.O., C.L., M., H.M., O., N.
trituberculata *Kirby*. N.C., C.L.
americana *Linn*. S.M., M.F.
Choleva basillaris *Say* [Spenciana *Kirby*]. B.C., M.F., O.K.
Liodes globosa *Lec*. S.M.

STAPHYLINIDÆ.

Quedius fulgidus *Fab*. B.C.
lævigatus *Gyll*. T.L.
Listotrophus cingulatus *Grav*. W., S.M.
Creophilus villosus *Grav*. [Staphylinus]. St.L., B.C., N.O., C.L., O.
Philonthus æneus *Rossi*. S.M.
cyanipennis *Fab*. A.O.
Lathrobium simile *Lec*. N.C.
Pæderus littorarius *Grav*. L'O.
Tachinus fumipennis *Say* (conformis *Dej.*). A.O.
Tachyporus jocosus *Say*. O.
Oxytelus pennsylvanicus *Er*. A.O.
Porrhodites fenestralis *Zett*. O.
Olophrum rotundicolle *Sahlb*. O.
Anthrobium pothos *Mann*. A.O., B.C.

Coccinellidæ.

Anisosticta strigata *Thunb.* O.
Hippodamia 5-signata *Kirby.* B.C., N.C., N.
13-punctata *Linn.* L'O., N., C.C.
Coccinella trifasciata *Linn.* B.C,, S.M., N.
9-notata *Hbst.* [novemnotatem *Fab.*]. St.L.
transversoguttata *Fab.* [5-notata *Kirby*]. B.C., N.
Harmonia picta *Rand.* [Coccinella]. A.O., B.C., H.M., M.F., T.L.
12-maculata *Gebl.* [Coccinella]. N.C.
Mysia pullata *Say.* S.M.
Anatis 15-punctata *Oliv.* N.O., N., R.A.
Psyllobora 20 maculata *Say.* B.C.

Cucujidæ.

Pediacus fuscus *Er.* (planus *Lec.).* A.O., St.L., N.O., S.M., O., C.C.
Cucujus clavipes *Fab.* A.O.
puniceus *Mann.* B.C.

Dermestidæ.

Dermestes caninus *Germ.* [nubilus *Say*]. O.
talpinus *Mann.* B.C., N.O.
lardarius *Linn.* A.O., S.M., N.
Attagenus piceus *Oliv.* [megatoma *Fab.*]. O.
Trogoderma tarsale *Melsh.* [inclusum *Lec.*]? O.
Anthrenus musæorum *Linn.* (castaneæ *Melsh.*). A.O.

Histeridæ.

Hister abbreviatus *Fab.* S.M.
depurator *Say.* B.C., S.M.
perplexus *Lec.?* L'O.
parallelus *Say* (Platysoma). A.O.
Dendrophilus punctulatus *Say.* S.M.
Saprinus oregonensis *Lec.* N.O., S.M.
fraternus *Say.* S.M.
mancus *Say.* S.M.
estriatus *Lec.* B.C.

NITIDULIDÆ.

Carpophilus niger *Say*. A.O.
Epuræa rufa *Say*. S.M.
immunda *Sturm*. O.K.
Nitidula bipustulata *Linn*. S.M.
Omosita colon *Linn*. St.L.
discoidea *Fab*. [illegible]
Ips fasciatus *Oliv*. (4 si[illegible] [illegible]uttatus *Fab*.]. L'O., T.L.

Peltis ferruginea *Linn*.
Calitys scabra *Thunb*. [illegible] B.C.
Thymalus fulgidus *Er*.

Cytilus sericeus *Forst*. (v[illegible] *Fab*. [illegible]O.
trivittatus *Melsh*. B.C.
Byrrhus Kirbyi *Lec*. [picipes *Kirby*]. St.L., B.C.

DASCYLLIDÆ.

Scirtes tibialis *Guér*. N.O.
Cyphon variabilis *Thunb*. S.M.

ELATERIDÆ.

Adelocera rorulenta *Lec*. B.C.
profusa *Cand*. B.C.
Cryptohypnus abbreviatus *Say* [silaceipes *Germ*.). A.O., B.C., S.M.
Elater nigrinus *Payk*. O.K., N.
luctuosus *Lec*. O.
apicatus *Say*. W., S.M.
Agriotes mancus *Say*. S.M.
stabilis *Lec*. (Dolopius). A.O.
fucosus *Lec*. (Dolopius). A.O., W., S.M.
oblongicollis *Melsh*. S.M.
Dolopius lateralis *Esch*. S.M.
Sericosomus incongruus *Lec*. B.C., N.

Corymbites virens *Schr.* [æneicollis *Ol.*]. B.C., O.K., O., N.
resplendens *Esch.* N.
spinosus *Lec.* O.
caricinus *Germ.* [umbricola *Esch.*]. B.C.
ochreipennis *Lec.* O.K., N., R.A.
triundulatus *Rand.* A.O., N.O.
cruciatus *Linn.* B.C., S.M.
Suckleyi *Lec.* B.C.
æripennis *Kirby.* B.C., C.L., O.
metallicus *Payk.* O.
Asaphes memnonius *Hbst.* S.M.

Buprestidæ.

Chalcophora virginiensis *Drury.* S.M.
Dicerca prolongata *Lec.* B.C., W., C.L., O., N.
tenebrosa *Kirby.* B.C., M., O.
Buprestis consularis *Gory.* S.M.
Nuttalli *Kirby.* N.C., N.O., O., N., C.C.
maculiventris *Say* (Ancylochira). A.O., St.L., M., O.K.
rusticorum *Kirby.* C.L., S.M., H.M., O.
fasciata *Fab.* S.M.
race Langii *Mann.* W.
Melanophila acuminata *DeG.* [longipes *Say*] [appendicula *Fab.*] B.C., W., S.M., N., C.C., C.R.
Drummondi *Kirby.* B.C., N.C.
Anthaxia æneogaster *Lap.* [inornata *Rand.*]. B.C.
Chrysobothris dentipes *Germ.* S.M.
trinervia *Kirby.* N.C., N.O., S.M., O.K.

Lampyridæ.

Calopteron terminale *Say* (Digrapha). A.O.
Celetes basalis *Lec.* O.K.
Eros simplicipes *Mann.* B.C.
aurora *Hbst.* [coccinatus *Say*]. A.O., B.C.
Plateros caniculatus *Say.* S.M.
lictor *Newm.* (mollis *Lec.*). A.O.

Ellychnia corrusca *Linn.* A.O., St.L., N.C., S.M., M.F., O.K., T.L., O., N.
race lacustris *Lec.* A.O., Y.F.
Pyractomena angulata *Say.* A.O.
Photinus ardens *Lec.* S.M.
Photuris pennsylvanica *DeG.* L'O., S.M.
Podabrus modestus *Sa*
piniphilus *Esch.* ed to piniphilus).
puberulus *Lec.*
lævicollis *Kirby.*
Telephorus fraxini *Say.* .C., N.O., S.M.
carolinus *Fab.* A.
nigritulus *Lec.* N.
scitulus *Say.* S.M
rotundicollis *Say.*
Curtisii *Kirby.* B
grandicollis *Lec.* B.C.

MALACHIDÆ.

Collops tricolor *Say.* O.K.
vittatus *Say.* C.C.

CLERIDÆ.

Trichodes Nuttalli *Kirby.* L'O.
Clerus spegeus *Fab.* B.C.
Thanasimus dubius *Fab.* L'O.
undulatus *Say* [Clerus]. B.C., Y.F., N.O., C.L., S.M., O.
Hydnocera humeralis *Say.* R.A.
Necrobia violaceus *Linn.* [Corynetes]. B.C., T.L.

PTINIDÆ.

Hadrobregmus foveatus *Kirby* (Anobium). A.O., O.
Dinoderus substriatus *Payk.* C.R.

LUCANIDÆ.

Platycerus depressus *Lec.* A.O., St.L., B.C., S.M.

(To be continued.)

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 144, Volume xxii.)

Genus SPILOSOMA Steph.

1830—Steph., Ill. Br. Ent., Haust., II., 74.
1856—Wlk., C. B. Mus., Lep. Het., III., 663.
1860—Clem., Proc. Ac. N. Sci, Phil, XII., 531.
1873—Stretch, Zyg. & Bomb., 130.

Head small, retracted; tongue short and weak, membraneous; palpi very short and feeble. Legs moderate, rather short; tibial spurs present but very feebly developed. Fore tibiæ unarmed. Antennæ moderately long, bipectinated in the male, simple or serrate in the female. The tarsal claws are toothed in all the species examined. In *virginica* the posterior tarsi only, in *vestalis* all are toothed.

The primaries have the cell somewhat shorter than usual, veins 7 to 10 on a stalk from the end of the subcostal in the order 10, 7, 9, 8; 3 to 5 are from the end of the median, 4 rather closer to 5 than to 3.

Secondaries with 6 and 7 together from the end of the subcostal, 8 from same rather past the middle, 3 to 5 from the end of the median, 4 much closer to 3 than to 5.

S. antigone Strk.

1879—Strk., Rept. Chief Eng., 1878–79, V., p. 1860, *Spilosoma.*
1883—Grt., CAN. ENT., XV, 9, = *congrua.*
1886—Hulst., Ent. Amer., II., 162, = *congrua.*
1889—Smith, Ent. Amer., V., 121, *an sp. dist. congrua.*

S. congrua ‡ Grt.

1883—Grt., CAN. ENT., XV., 9, *Spilosoma.*
1886—Hulst*, Ent. Amer., II., 15, *Spilosoma.*
1889—Soule & Elliot*, Psyche, V., 259, life hist.

Habitat—Mass., N. Y., Ga., Colorado.

My reasons for this synonomy are given in Ent. Amer., V., 121. Walker's description does not apply to *antigone* at all, while it does apply to *cunea*, a specimen of which, according to Butler, was of the "types."

S. latipennis Stretch.

1872—Stretch, Zyg. & Bomb., 133, pl. 6, f. 5, ♀, *Spilosoma.*

1874—Lint., Ent. Cont., III., 144, *Spilosoma.*

1883—Edw.*, Papilio, III., 190, *Spilosoma.*

1884—Hulst*, Bull. Bkln. Ent. Soc., VII., 120, *Spilosoma.*

Habitat—Buffalo, Albany and L. I., N. Y.; Mass., N. J.

This species seems to fav t swampy meadows. I have taken specimens in such loca ngly.

S. niobe Strk.

1884—Strk., Proc. Ac. N XXXVI., 284, *Spilosoma.*

Habitat—Florida.

This species I do not knov

S. prima Slosson.

1889—Slosson, Ent. Ame *losoma.*

Habitat—Franconia N. H

Mrs. Slosson's captures at ndicate that there is a great deal yet to be done by the thorough collector in the mountainous parts of New England.

S. vestalis Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 125, *Spilosoma.*

1872—Stretch, Zyg. & Bomb., 133, pl. 6, ff. 7 (♂) and 8 (♀) *Spilosoma.*

1876—Edw.*, Proc. Cal. Ac. Sci., VII., 22, *Spilosoma.*

Habitat—California.

Food plant—*Lupinus* sp.

S. virginica Fabr.

1798—Fabr., Ent. Syst. Suppl., 437, *Bombyx.*

1833—Harris, Cat. Ins. Mass., 591, *Arctia.*

1841—Harris*, Rept. Ins. Mass., 248, *Arctia.*

1856—Wlk., C. B. Mus. Lep. Het., III., 668, *Spilosoma.*

1857—Fitch, 3rd Rept. Ins., N. Y., *Spilosoma.*

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 531, *Spilosoma.*

1862—Morris*, Synopsis, Supplt., 342, *Spilosoma.*

1862—Harris*, Inj. Insects, 350, ff. 167–168, *Arctia.*

1862—Morris in note to Harris, l. c., *Spilosoma.*

1863—Saunders, Syn. Can. Arct., 14, *Spilosoma.*

1871—Riley*, 3rd Rept. Ins. Mo., 68, f. 28, *Spilosoma.*

1871—Riley*, Am. Ent., II., 272, f. 170, *Spilosoma.*
1872—Stretch*, Zyg. & Bomb., 131, pl. 6, f. 6, *Spilosoma.*
1873—Edw., Proc. Cal. Ac. Sci., V., 187, *Spilosoma.*
1878—Lint.*, Ent. Cont., IV., 143, *Spilosoma.*
1880—Saund.*, CAN. ENT., XII., 56, f. 9, *Spilosoma.*
1883—Saund.*, Fruit Insects, 271, f. 281, *Spilosoma.*
1884—Bean*, Papilio, IV., 66, *Spilosoma.*
1887—Bruce*, Ent. Amer., III., 140, *Spilosoma.*
1888—Dimmock, A. K., Psyche, IV., 281, *Spilosoma.*
Habitat—U. S. generally, Canada, Nova Scotia, H. B. Terr.

This species is the most widely distributed of the genus; its bibliography is very much more extensive than above given, if the economic literature be taken into account. The larva is omnivorous.

Genus HYPHANTRIA Harris.

1841—Harris, Rept. Ins. Mass., 255.
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 530.
1862—Harris, Inj. Insects, 358.
1873—Stretch, Zyg. & Bomb., 204.
1876—Moeschl., Stett. Ent. Zeit., XXXVII., 297.

Head small; tongue weak and short; palpi mere rudiments. Antennæ moderate in length, shorter and simple in the female, bipectinated in the male. Legs short and rather slender. Spurs of middle tibiæ very short and weak; posterior tibiæ with small terminal spurs only; anterior tibiæ with a small spine each side of tip. Claws simple.

Primaries with 7 to 10 on a stalk, 10 very close to the base of the stalk; 7, 8 and 9 close together near the apex; 3, 4 and 5 from the end of the median; 4 and 5 from the same point, or on a short stalk, 3 very close to 4.

Secondaries, 8 from subcostal past the middle; 6 and 7 on a long stalk from end of subcostal; 4 and 5 from the same point from end of median; 3 somewhat remote from 4.

Despite its superficial resemblance to *Spilosoma* this is really a strongly marked genus.

H. cunea Dru.
1770—Drury, Ex. I., XVIII., f. 4, *Bombyx.*
1816—Hübn., Verzeichniss, 184, *Cycnia.*

1825—Hübn., Zutraege, 203, ff. 405, 406, *Cycnia.*
1837—Westw., ed. Dru., I., 34, *Spilosoma.*
1856—Wlk., C. B. Mus., Lep. Het., III., 669, *Spilosoma.*
1856—Fitch.*, 3rd Rept. Ins., N.Y., 384, *Hyphantria.*
1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 531, *Hyphantria.*
1862—Clem., in Mor[illegible] *Hyphantria.*
1862—Morris, Synop[illegible] *a.*
1865—Wlk., C. B. M[illegible] XXII., 352, *Hyphantria.*
1873—Stretch*, Zyg. ♂ [illegible] VIII., ff. 18-20, *Hyphantria.*
1875—Butler, Cist. En[illegible] *antria.*
1881—Graef., Bull. Bkln. [illegible] I., 14, *Spilosoma.*
1881—French, Bull. Bk[illegible] II., 31, *Spilosoma.*
1887—Riley*, Bull. X., [illegible] S. Dept. Agl., *Hyphantria.*

H. punctatissima A. & S.

1797—Abb. & Sm.*, Ins. [illegible] II., [illegible], pl. 70, *Phalæna.*
1825—Hübner, Zutraege, 203, *pr. syn.*
1837—Westw., ed. Drury, I., 34, *pr. syn.*
1841—Harris*, Rept. Ins., Mass., 255, *Hyphantria.*
1862—Harris*, Inj. Ins., 358, *Hyphantria.*
1862—Morris, note to Harris, l.c., *pr. syn.*
1871—Saund.*, CAN. ENT., III., 36, *Hyphantria.*
1881—Graef., Bull. Bkln., Ent. Soc., III., 14, *pr. syn.*

H. congrua Wlk.

1856—Wlk., C. B. Mus., Het., III., 669, *Spilosoma.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 532, *Spilosoma.*
1862—Morris, Synopsis, Supplt., 343, *Spilosoma.*
1868—Grt. & Rob., Trans. Am. Ent. Soc., II., 72, *Spilosoma.*
1873—Stretch, Zyg. & Bomb., 130, *Spilosoma.*
1875—Butler, Cist. Ent., II., 33, =*cunea.*
1883—Grt.‡, CAN. ENT., XV., 9, *Spilosoma.*
1889—Smith, Ent. Amer., V., 121, =*cunea.*

H. punctata Fitch.

1856—Fitch, 3rd Rept. Ins., N. Y., 387, *Hyphantria.*
1862—Morris, Synopsis, Supplt., 344, *Spilosoma.*
1874—Stretch, Zyg. & Bomb., 204, *Hyphantria.*
1875—Butler, Cist. Ent., II., 33, *pr. syn.*

1881—Graef, Bull. Bkln. Ent. Soc., III., 14, *pr. syn.*
1881—French, Bull. Bkln. Ent. Soc., III., 31, *pr. syn.*

H. textor Harris

1828—Harris*, New Engl. Farmer, VII., 33, *Arctia.*
1833—Harris, Cat. Ins. Mass., 591, *Arctia.*
1841—Harris*, Rept. Ins. Mass., 255, *Hyphantria.*
1856—Fitch*, 3rd Rept. Ins., N. Y., 387, *Hyphantria.*
1856—Wlk., C. B. Mus., Lep. Het., IV., 834, *Euproctis.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 530, *Hyphantria.*
1862—Morris, Synopsis Supplt., 344, *Spilosoma.*
1862—Harris*, Inj. Ins., 358, pl. VII., ff. 10–12, *Hyphantria.*
1862—Morris, in Harris l. c. note, *Spilosoma.*
1865—Walk., C. B. Mus., Lep. Het., XXXII., 351, *Hypantria.*
1870—Riley*, Am. Ent., I., 59, *Hyphantria.*
1871—Riley*, 3rd Rept. Ins., Mo., 130, f. 55, *Hyphantria.*
1871—Walsh*, 2nd Rept. Ins., Ills., 18, *Hyphantria.*
1871—Saund.*, CAN. ENT., III., 69, *Hyphantria.*
1873—Stretch*, Zyg. & Bomb., 206, pl. VIII., f. 21 (♂), *Hyphantria.*
1875—Edw.*, Proc. Cal. Ac. Sci., VI., 187, *Hyphantria.*
1875—Butler, Cist. Ent, II., 33, *Hyphantria.*
1881—Johnson*, CAN. ENT., XII., 18, *Hyphantria.*
1881—Graef, Bull. Bkln. Ent. Soc., III., 14, = *cunea.*
1881—French, Bull. Bkln. Ent. Soc., III, 31, = *cunea.*
1881—Riley, Gen. Index to Mo. Reports, 55, = *cunea.*
1883—Saund.*, Fruit Insects, 71, ff. 66–68, *Hyphantria.*
1888—Dimmock*, A. K., Psyche, IV., 280, *Hyphantria.*

H. candida Wlk.

1864—Wlk., C. B. Mus., Lep. Het., XXXI., 291, *Spilosoma.*
1868—Grt. & Rob., Trans. Am. Ent. Soc., II., 84, *pr. syn.*
1875—Butler, Cist. Ent., II., 33, *an sp. dist?*
Habitat—United States and Canada.

An elaborate list of food plants is given in Bull. X. of the Division of Entomology, U. S. Dept. of Agriculture, to which reference is made above. The synonymy is the generally accepted one, except as to *congrua*, which is added for the first time. In Mr. Grote's list of 1882, *textor* and *punctata* stand without number but in Roman letters, and therefore not as synonyms. There is no doubt at all of the identity of all

these forms. Prof. Riley has proved that to demonstration, if proof were required to the statements of earlier writers.

Genus EUPSEUDOSOMA Grt.

1865—Grt., Proc. Ent. Soc., Phil., 240.

This genus I do not know autoptically. Mr. Grote, describing a male, gives the character, following notes are made: Body stout; finely scaled, sq and short; head prominent, eyes large; tongue moderate, aled, not exceeding the front; legs rather stout, finely scal with minute spurs; antennæ long, biserrate, tapering to the tions short, acute and rather distant; primaries large, tria produced, costa very straight, external margin oblique; dis veins 3, 4 and 5 very nearly from one point, 2 not greatly 3.

Unfortunately, Mr. Grote cribe the arrangement of the costal series, but it is probabl from *Spilosoma*. The venation of the secondaries is not described. Our only described species is:

E. floridum Grt.

1882—Grt., CAN. ENT., XIV., 187, *Eupseudosoma*.

Habitat—Florida.

Said to be closely allied to the Cuban *E. niveum*.

Genus EUCHAETES Harris.

1841—Harris, Rept. Ins., Mass., 257.
1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 532.
1862—Harris, Inj. Insects, 360.
1873—Stretch, Zyg. & Bomb., 185, *syn. spec.*
1882—Grt., CAN. ENT., XIV., 196, *syn. spec.*

Pygarctia Grt.

1871—Grt., CAN. ENT., III., 124.

Head moderate or rather large, closely applied to the thorax; eyes large, but not prominent. Palpi slender, not exceeding the middle of the front; third joint moderate. Tongue long, corneous. Antennæ long, in the ♂ rather lengthily bipectinated. Legs with rather close vestiture, posterior but little the longer, spurs normal. Vestiture hairy, but rather close. Abdomen exceeding secondaries, cylindric, obtusely terminated.

Primaries with 10 out of the subcostal before the end, 7 to 9 on the

same stalk, 8 and 9 dividing just before the apex; 6 out of the same point with the stalk bearing 7–9; 3, 4 and 5 close together from the end of the median.

Secondaries: Subcostal rather long, forking to give rise to 6 and 7 unusually close to apex; costal very short from the subcostal beyond its middle; 3, 4 and 5 very close together out of the end of the median.

These studies were made on *E. egle*. In Mr. Grote's paper on the genus in CAN. ENT., XIV., 196, is an excellent table of the species at that time known, which renders their recognition easy. Several have been since described. From what we know of the early history of some of the species, dimorphism occurs in the genus, and some of the described forms may yet prove synonyms.

E. abdominalis Grt.

1871—Grt., CAN. ENT., III., 124, *Pygarctia*.
1873—Grt., Buff. Bull., I., 34, *Pygarctia*.
1882—Grt., Papilio, II., 111, *Euchaetes*.
1882—Grt., CAN. ENT., XIV., 196, *Euchaetes*.
Habitat—Alabama.

E. bolteri Stretch.

1885—Stretch, Ent. Amer., I., 106, *Euchaetes*.
Habitat—Texas.

E. collaris Fitch.

1856—Fitch, 3rd Rept. Ins., N. Y., 265, *Hyphantria*.
1862—Morris, Synopsis, 344, *Spilosoma*.
1864—Pack., Proc. Ent. Soc., Phil., III., 130, =*egle*.
1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 75, =*egle*.
1873—Stretch, Zyg. & Bomb., 188, pl. 8, f. 5 ♂, *Euchaetes*.
1874—Lint.*, Ent. Cont., III., 146, *Euchaetes*.
1877—Van. Wag.*, CAN. ENT., IX., 171, *life hist*.
1880—Jewett*, CAN. ENT., XII., 228, *Euchaetes*.
1882—Grt., CAN. ENT., XIV., 196, *Euchaetes*.
1883—Edw.*, Papilio, III., 146, *Euchaetes*.

E. antica Wlk.

1857—Wlk., C. B. Mus., Lep. Het., VII., 1745, *Tanada*.
1868—Grt. & Rob., Tr. Am. Ent. Soc., II., 75, =*egle*.
1873—Stretch, Zyg. & Bomb., 188, *pr. syn*.
1875—Butler, Cist. Ent., II., 37, *pr. syn*.

E. sciurus Bdv.

1868—Bdv., Lep. Calif. (Ann. Soc. Ent., Belg., XII.), 79, *Arctia.*
1869—Grt. & Rob., Tr. Am. Ent. Soc., III., 174, =*L. acræa.*
1873—Stretch, Zyg. & Bomb., 188, =*collaris.*
1875—Butler, Cist. Ent., II., 37, =*collaris.*
Habitat—Canada, New York, Ohio, California.
Food plant—Apocyn ium, and Asclepias sp.

E. egle Drury.

1773—Dru., Exot. II. *Bombyx.*
1837—Westw., ed. Dr *losoma.*
1841—Harris*, Rept. 1... , *Euchaetes.*
1856—Wlk., C. B. Mu II., 669, *Spilosoma.*
1860—Clem., Pr. Ac. XII., 352, *Euchaetes.*
1862—Harris*, Inj. I -174, *life hist.*
1862—Morris, Synops. *na.*
1862—Clem., in App. to MOR ., *Euchaetes.*
1869—Harris*, Ent. Corresp., 288, pl. 2, f. 5, (larva), *Euchaetes.*
1872—Strk., Lep. Rhop et. Het., I., 3, *Euchaetes.*
1872—Lint.*, Ent. Cont., II., 136, *Euchaetes.*
1873—Stretch, Zyg. & Bomb., 186, pl. 8, f. 4, *Euchaetes.*
1874—Pack., Rept. Geol. Surv., 1874, 558, *Euchaetes.*
1880—Andrews*, Psyche II., 271, *Euchaetes.*
1880—Jewett, CAN. ENT., XII., 230, *life hist.*
1882—Grt., CAN. ENT., XIV., 196, *Euchaetes.*
1883—Hy. Edw.*, Papilio, III., 147, *Euchaetes.*
1884—French*, CAN. ENT., XVI., 221, *Euchaetes.*
Habitat—New York, New Jersey, Mass., Maine, Ills., Colorado, Canada.
Food plant—Asclepias cornutus, etc.

E. eglenensis Clem.

1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 533, *Euchaetes.*
1875—Butler, Cist. Ent., II., 37, ? =*egle.*
1882—Grt., CAN. ENT., XIV., 196, *Euchaetes.*
1882—Grt., Papilio, II., 111, *Euchaetes.*
1883—Hy. Edw.*, Papilio, III., 147, *Euchaetes.*
Habitat—Texas.
Food plant—Asclepias sp.

(To be continued.)

A MONTH ON VANCOUVER ISLAND.

BY H. F. WICKHAM, IOWA CITY, IOWA.

But little seems to have been written on the fauna of this interesting island, and therefore I hope that a few notes bearing on the subject may not be without interest to the readers of the CANADIAN ENTOMOLOGIST. It was my good fortune to spend nearly a month in the vicinity of Victoria last summer, and I append some account of observations made at the time.

The Cicindelidæ are represented only by two species of *Omus* and by *Cicindela oregona*, the latter flying on the beach. *Omus audouinii* also frequents the beach, hiding under logs high enough up to be out of the the way of the water, while *O. dejeanii* dwells in the woods, and may be found under damp logs.

Two species of *Cychrus*—*angusticollis* and *marginatus*—are found in the heavy forest, and may be dug out of very rotten logs, or found in hollow roots of trees. They both seem to be rather common in places, as I dug over fifty *angusticollis* and a number of *marginatus* out of a single log. The former species emits a very strong and unpleasant odor when disturbed by handling.

Carabus oregonensis seems to prefer rather more open spots, and I took it mostly in the lanes around the outskirts of the town. These specimens are larger than those from Oregon and Washington, and have lighter colored elytra—resembling a specimen shown to me as coming from Sitka. Many other Carabidæ are common, especially *Blethisa*, *Notiophilus*, *Leistus*, *Nebria* and *Bembidium*.

Seashore collecting yields a rich return here, and nearly every log thrown up by the waves out of reach of the tides has its colony of beetles underneath. They are of various species and represent nearly all the large families, though, perhaps, Staphylinidæ are the most abundant. The large *Hadrotes crassus* may be seen under any log or bunch of kelp, which is damp enough to suit. Then we see *Cafius* represented by three species and numerous specimens of a little *Aleochara*, these living mostly in seaweed, along with *Cercyon fimbriatum*, a widely distributed species which I found in plenty at San Diego. The little Trichopterygid with the formidable name—*Motschulskium sinuatocolle*—may be seen on the under surface of logs on the beach, and the omnipresent *Dermestes* looks out for whatever the sea may give up of its dead.

Occasionally a good *Elaterid* is found. I got my only specimen of

Corymbites carbo on the beach, and in dead wood *Hadrobregmus gibbicollis* makes its burrows. The curious little Malachiid known as *Endeodes collaris* runs on the salt sand, and an occasional *Ceruchus* may be seen under the drift.

I found no maritime Chrysomelids, but the Tenebrionidæ furnish an *Eleodes* and a *Coniontis* together with an occasional *Phaleria*. *Anthicidæ* were rare here, though comm[illegible]uth, but in the Rhyncophora some very interesting species [illegible]

In this group I found *Agasp*[illegible] and *Amnesia decorata* both on the beach, and once came ac[illegible]olony of *Emphyastes fucicola*, one of the most curious looking w[illegible]ve ever seen. The testaceous color of this species seems to b[illegible] by a great many others, which are strictly confined to a life on [illegible] beach. *Elassoptes marinus* is common under logs, boring in them from the lower surface, in company with a species of *Rhyncholus*.

Just back of the beach, near the park, is a nearly level space overgrown with various plants, a large majority of which are leguminous, and in the pods of these breed *Apion antennatum* and a species of *Bruchus*. With a sweep net vast numbers of these may be taken, along with numerous individuals of a species of *Ceutorhynchus*. In the lanes the sweep net may be used to great advantage, and some good species are certain to be taken—mostly Elateridæ in June, the month in which my work was done. These Elaterids form one of the most striking features in the fauna of the island, and are numerous both in species and individuals. *Corymbites* and *Athous* seemed the most plentiful of the larger forms, while *Dolopius* and *Megapenthes* represented the smaller.

Serica anthracina and *Odontæus obesus* were the only Scarabæids of note that I found, and these both, but rarely *Lepturæ* were the commonest longhorns, though a few others came to hand in beating: *Eumichthus œdipus* on flowers, *Molorchus longicollis* and *Xylotrechus annosus* on willows.

Chysomelidæ are also rather backward in showing themselves. I took only one *Donacia* by careful search, and the only Cryptocephalids seem to be *Diachus auratus* and *D. catarius*. I took *D. auratus* in the mountains of Arizona in 1888 and have *D. catarius* from Michigan, so these forms are both very widely distributed. *Plagiodera oviformis* occurs on low ground with *Prasocuris vittata* and the familiar green of *Crepidodera helxines* shines on the willows.

In the meadows I found a few specimens of *Epicauta puncticollis*, but that was all I saw of the Meloidæ. We could hardly expect to find many of them so far north however.

Having a love for Rhyncophora I took pains to get as large a series as possible, and was rewarded by finding quite a number of species. *Rhynchites bicolor* lives on roses there, as I believe it does everywhere in North America, in fact I doubt if there is a spot on this continent where roses grow, that *Rhynchites bicolor* does not inhabit too. Besides *A. nigra* and *A. decorata* previously mentioned, other species of Otiorhynchids may be found, and of these *Amnesia granicollis* and *Sciopithes obscurus* are the most plentiful. The former is found in moss or around the roots of grass under logs, while the latter lives on various bushes, preferring blackberry, I think. In company with the *Amnesia* may be found large numbers of a species of *Sitones*, which may some day require the attention of the economist. The injury done to the roots of grass by this little beetle must, I think, be considerable.

I took one *Plinthodes taeniatus* from a rotten log, and two or three *Trichalophus didymus* on low ground among a lot of willows. *Apion* has already been spoken of, *Lepyrus* is common on willow with *Dorytomus brevicollis*, *D. mannerheimii*, *Magdalis salicis* and *Orchestes niger*.

Sweeping in a field yielded a fine specimen of *Trachodes quadrituberculatus*, one of *Phytonomus setigerus* and two or three of a new *Anthonomus*. *Ceutorhynchus* furnished two or three species, *Pelenomus* one, and *Phytobius* one, probably *P. velatus* Beck, a very interesting species of wide distribution, occurring in Michigan and Illinois as well as in Europe. I found no signs of *Centrini* and no *Sphenophorus*. The Scolytidæ taken were all of two species—*Scolytus unispinosus* and *Hylesinus aspericollis*.

There seems to be a preference among water-beetles for small bodies of water, and often after sifting the waters at the edge of a lake or stream with little or no success, I have thoroughly cleaned out a little spring or puddle and found it swarming with them. This experience, repeated so often before, was gone through again at Victoria and I made quite a collection of aquatics in the course of a couple of hours. The species were few in number—not over twenty probably—but there were a good many examples of some of them. The genera *Bidessus*, *Deronectes*, *Agabus*, *Dytiscus*, *Helophorus*, and *Hydrobius* hold the bulk of the species.

Before closing I wish to speak of the results of sifting, a method of collecting which is sadly neglected by many collectors, but which yields some of the rarest and most interesting species. I had expected a good deal of material to result from the use of the sieve here and was not disappointed. Putting in a good-sized bundle of moss and rubbish I shake it over a white cloth and out tumble the beetles faster than I can take care of them—little Staphylinidæ now and then a *Tychus cognatus* or *Batrisus zephyrinus*, dozens of *Cyphon exiguus* and single specimens of various kinds. Once in a while some weevil falls out or a *Simplocaria*, *Bembidium* is racing around the cloth, and so are the little —almost invisible—Trichopterygidæ, in which the fauna of the Island is rich. Many Latridiidæ also fall through the wires.

I would recommend this Island as a fine field for investigation by any Entomologist who wishes to spend his summer in a spot charming in itself and rich in insect life. While the fauna of the Island is in some degree marked by one of the peculiarities of the Pacific coast—i. e. a less number of species occupying a given small area than is the case in the East—there are enough to keep one always happy by finding something new or of interest, and material from this region is in good demand among students of our North American fauna, therefore duplicates find a ready exchange. My own work was done mostly in the Coleoptera, but insects of other orders seemed to be plentiful, with the exception of Lepidoptera. There may be more of these however at other seasons of the year.

THE ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO

will be held in the rooms of the Society, at London, on Wednesday, August 27th, at 9.30 a. m.

THE ENTOMOLOGICAL CLUB OF THE A. A. A. S.

will meet in a room to be assigned by the local committee in the Capitol building at Indianapolis, Indiana, Wednesday, August 20th, at 9 a.m., when members will register and obtain the Club badge. Members intending to contribute papers will send the titles to the President, Prof. A. J. Cook, Agricultural College, Michigan, or F. M. Webster, Lafayette, Ind. It is to be hoped that members will contribute freely, not only to the proceedings of the Club, but also to those of Section " F ".

F. M. WEBSTER, Sec. Ent. Club A. A. A. S.

Mailed August 6th.

The Canadian Entomologist.

VOL. XXII. LONDON, SEPTEMBER, 1890. No. 9.

A SUGGESTION AS TO THE GENERIC NOMENCLATURE OF INSECTS.

BY T. D. A. COCKERELL, LONDON, ENGLAND.

Mr. Scudder's recent admirable work on the butterflies of New England has, naturally enough, given rise to fresh discussion of the question of generic nomenclature, without, however, leading to any very decisive result. Mr. Scudder's views on the sub-division of hitherto-accepted generic units are certainly extreme, and probably few will be found to follow him entirely. On the other hand, many no doubt feel that Mr. W. H. Edwards's genera require some sort of sub-division, and would compromise matters by admitting some, and rejecting others, of Mr. Scudder's divisions. Mr. Edwards himself, in his 1884 catalogue, has numbered sub-divisions of many larger genera; thus of *Lycæna* we get groups I. to VII. But these numbers are not adopted by others, partly because different authors treat the subject differently, thus creating confusion, and partly because it is not easy or convenient to use a number instead of a name.

So we come to this conclusion: It is necessary that the larger genera should be sub-divided, but it is highly unadvisable to call all those sub-divisions genera. We therefore need a system of section or group-names which shall be uniform, used generally,—not, like the numbers, variable according to the fancy of the author,—and yet not of the nature of genera or sub-genera.

In the treatment of *Carex* by the botanists I think we see a similar problem solved. *Carex* is a huge genus, which even after a reasonable amount of subgeneric division, needs further grouping to be made intelligible. So, Fries, Drejer, Tuckerman and others have proposed section-names: *Flexiles*, *Paniceæ*, *Sigitatæ*, etc. These names are always in the plural, and have nothing to do with sub-genera or genera properly speaking, nor does any trouble arise about priority, provided the name has not been used before in the same genus. The groups may not

be all of equal value, and there are sections again sub-divided into sections. This system is not new, and I believe it to be very useful, allowing us to recognize the natural sub-divisions of genera, without being obliged to make genera of them. I have already adopted these section-names in a list of North American land-shells now ready for printing, and have thereby been able to reduce the number of so-called sub-genera without refusing to notice the natural groups they represent. I derived my section-names when convenient from a prominent species of the group, or in other cases, by adopting a descriptive term, or turning a sub-generic name into a plural section-name.

Before writing this paper, I wrote to Mr. W. H. Edwards, telling him of my idea for getting out of the present difficulty. He comments favourably on the suggestion, and writing of Mr. Scudder's "genera," made by sub-division of *Colias*, etc., he says: "I consider them groups merely, or sub-groups. All *Anthocharis*, I think, should be one [genus], all *Argynnis* one, all *Colias* one. If numbers can't be accepted, I am perfectly willing to try the section-names as you suggest * * *. By-and-by I propose to give a new edition of my catalogue, and then I may adopt the plan throughout. It would save us from fifty genera in *Pamphila* at once." (*in litt.*, May 17, 1890.)

Should Mr. Edwards decide to adopt section-names, we can hardly do better than leave him to decide about the sections and choose appropriate names; but to illustrate the point I will here treat a few "genera" as proposed:—

W. H. Edwards.	Scudder.	Proposed Section-Name.
Papilio, group V.	Jasoniades.	Turni.
Colias, group I.	Zerene.	Cæsoniæ.
Vanessa, pars.	Euvanessa.	Antiopæ.
Pamphila, group II., pars.	Erynnis.	Erynnes.
Thecla, group IV., pars.	Incisalia.	Incisaliæ.
Lycæna, group V.	Rusticus.	Rustici.
Chrysophanus, group III.	Heodes.	Chrysophanuli.

As will be seen, the first three names are taken from prominent species; the second three from the so-called genera, and the last from a character of the group. It may be found advisable, at least as often as possible, to adopt the name from a species; but some specific names, as *poweschick*, *pawnee*, etc., would be rather difficult to render plural, not to

speak of the objection to increasing the use (as section-names) of such extraordinary appellations. The plural termination, I should think, ought always to be Latinised.

The same principle may, of course, be applied to other groups of insects. Such genera as *Agrotis*, *Pterostichus*, *Tipula*, *Bombus*, etc., might be well sectionised.

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 168, Volume xxii.)

E. elegans Str.

1873—Stretch, Zyg. & Bomb., 189, pl. 8, f. 6, *Euchaetes.*

1875—Butler, Cist. Ent., II., 37, *Euchaetes.*

1876—Stretch, Wheeler's Rept. Surv., west 100 mer., V., 797, pl. 40, ff. 5 and 6, *Euchaetes.*

1882—Grt., CAN. ENT., XIV., 196, *Euchaetes.*

Habitat—California, Owens Valley.

E. immaculata Graef.

1887—Graef., Ent. Amer., III., 42, *Euchaetes.*

Habitat—Florida.

E. inopinatus Hy. Edw.

1882—Edw., Papilio, II., 13, *Euchaetes.*

Habitat—Florida.

E. murina Stretch.

1885—Stretch, Ent. Amer., I., 106, *Euchaetes.*

1887—Graef., Ent. Amer., III., 142, *Euchaetes.*

Habitat—Arizona, Texas.

E. oregonensis Stretch.

1873—Stretch, Zyg. & Bomb., 187, pl. 8, f. 7, *Euchaetes.*

1874—Lint.*, Ent. Cont., III., 145, *Euchaetes.*

Habitat—Oregon, Texas, New York.

E. perlevis Grt.

1882—Grt., CAN. ENT., XIV., 196, *Euchaetes.*

1882—Grt., Papilio, II., 131, *Euchaetes.*

Habitat—Arizona.

E. pudens Hy. Edw.

1882—Edw., Papilio, II., 126, *Euchaetes.*
1882—Grt., CAN. ENT., XIV., 196, *Euchaetes.*
Habitat—Texas.

E. scepsiformis Graef.

1887—Graef, Ent. Amer., I[illegible] *haetes.*
Habitat—Texas.

E. spraguei Grt.

1875—Grt., CAN. ENT., VII., 200, *Euchaetes.*
1877—Grt., CAN. ENT., IX., 85, *Euchaetes.*
1882—Grt., Papilio, II., 111, *Euchaetes.*
1882—Grt., CAN. ENT., XIV., 196, *Euchaetes.*
Habitat—Kansas, Texas.

E. vivida Grt.

1882—Grt., Papilio, II., 131, *Euchaetes.*
1882—Grt., CAN. ENT., XIV., 196, *Euchaetes.*
Habitat—South-western Texas.

E. yosemite Hy. Edw.

1883—Edw., Papilio, III., 146, *Euchaetes.*
Habitat—San Jose Valley, California.

E. zonalis Grt.

1882—Grt., Papilio, II., 131, *Euchaetes.*
1882—Grt., CAN. ENT., XIV., 196, *Euchaetes.*
Habitat—Arizona.

The genus *Vanessodes* G. & R., which Mr. Grote inserts in this place seems to be a *Lithosian.* I cannot demonstrate ocelli in any specimens I have examined. The venation and habitus is also Lithosiform rather than *Arctiid.*

Genus ARACHNIS Hbn.

1837—Hübner, Zutræge, 457.
1873—Stretch, Zyg. & Bomb., 83.

Head very small, retracted; palpi small; tongue short and weak, not longer than the head. Legs short and stout; tibiæ with the spurs normal in number, but very short.

Primaries with 7 to 10 on a stalk, 10 branching a very short distance from the end of the subcostal, 7 to 9 branching rather beyond the middle of the common vein ; 3, 4 and 5 almost equidistant from the end of the median.

Secondaries with 6 and 7 forking from the subcostal slightly before the end of the cell ; 3, 4 and 5 very close together from the end of the median.

The antennæ are simple in both sexes, and the tarsal claws are also simple.

A. picta Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 126, *Arachnis.*
1873—Stretch*, Zyg. & Bomb., 83, pl. 3, f. 6, ? = *aulæa.*
1876—Moeschl., Stett. Ent. Zeit., XXXVII., 298, *Arachnis.*
Habitat—California, Colorado.
Food plant—Lupinus sp.

A. aulæa Geyer.

1837—Geyer, Zutraege, 913, 914, *Arachnis.*
1860—Clem , Proc. Ac. N. Sci., Phil., XII., 526, *Arachnis.*
1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 78, *Ecpantheria.*
1873—Stretch, Zyg. & Bomb., 86, *Arachnis.*
1876—Moeschler, Stett. Ent. Zeit., XXXVII., 298, *Arachnis.*
incarnata Wlk.
1855—Wlk., C. B. Mus., Lep. Het., III., 690, *Ecpantheria.*
1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 524, *Ecpantheria.*
1865—Wlk., C. B. Mus., Lep. Het., XXXI., 300, *pr. syn.*
Habitat—California, Mexico.

Whether we have here to do with one or two species is a question ? Packard, in describing his species, does not refer to *aulæa* at all. Moeschler says the difference between the two is that in *picta* the costal margin of primaries beneath is yellow, whereas in *aulæa* it is red. Whether or not the Mexican form is different from the Californian examples must be settled by those who have the material. All the California specimens I have ever seen refer to the *picta* variety.

Genus EUERYTHRA Harv.

1876—CAN. ENT., VIII., 5.
1887—Smith, Proc. U. S. Nat. Mus., X., 335.

Head moderate in size, scarcely retracted; tongue weak; palpi small, longer in the ♀. Antennæ of ♂ bipectinated, of the ♀ simple. Legs almost equal in length, spurs normal in number but short.

Primaries with 7 to 10 stalked, out of the same point with 6 from the end of the subcostal; 3, 4 and 5 from the end of the median, 4 more remote from 3 than from 5.

Secondaries without costal vein, subcostal extended some little distance beyond the end of the cell and forking to give off 6 and 7; 3, 4 and 5 from the end of the median, 5 rather more remote from 4 than is 3.

For further details I would refer the student to my paper in Proc. U. S. Nat. Mus., X., 335.

E. phasma Harv.

1876—Harv., CAN. ENT., VIII., 5, *Euerythra.*

1887—Smith, Proc. U. S. Nat. Mus., X., 336, *Euerythra.*

Habitat—Texas.

E. trimaculata Smith.

1887—Smith, Ent. Amer., III., 17, *Euerythra.*

1887—Smith, Proc. U. S. Nat. Mus., X., 336, *Euerythra.*

Habitat—Texas.

The two species are closely allied, but are, I believe, distinct.

Genus ECPANTHERIA Hbn.

1816—Hübner, Verzeichniss, 183.

1855—Walker, C. B. Mus., Lep. Het., III., 668.

1862—Morris, Synopsis, 347.

1873—Stretch, Zyg. & Bomb., 174.

Tongue very short and weak. Legs short and stout, subequal in length; middle and posterior tibiæ with minute terminal spurs only. Tarsi short, the claws split nearly to the base in both sexes. Antennæ of the male serrate, of the female simple.

Primaries with 6 to 10 stalked out of the end of the subcostal, 6 branching off almost immediately, 10 a little further on, 7 more than half way to apex, while 8 and 9 divide just before the apex; 3, 4 and 5 from the end of the median, 4 nearer to 5 than to 3.

Secondaries with 8 from the subcostal unusually close to base; 6 and

7 from the same point at the end of the subcostal ; 4 and 5 from the same point at end of median, 3 very close to the same source.

The wing form of the genera has not been described very generally in these notes, but in this genus it may be added that the secondaries are disproportionately small and tend to become caudate.

E. permaculata Pack.

1872—Pack., 4th Rept. Peab. Ac. Sci., 86, *Leucarctia.*
reducta Grt.
1877 –Grt., Bull. U. S. Geol. Surv., III., 799, *Ecpantheria.*
1887–-Bruce, Ent. Amer., III., 14, *Ecpantheria.*
cæca Strk.
1884—Strk., Proc. Ac. Nat. Sci., Phil., XXXVI., 283, *Ecpantheria.*
Habitat—Colorado, Arizona, So. California.

Dr. Packard's term *permaculata* seems to have become lost in some way. It is not referred to in Mr. Grote's list, and Mr. Edwards does not mention it in his additions in Ent. Amer., III. It refers without doubt to the *reducta* of Grote. Mr. Bruce has taken it quite abundantly in Colorado.

E. scribonia Stoll.

1787—Stoll*, Sup. to Cramer's Pap. Ex., f. 177, pl. 41, f. 3, *Phalæna.*
1816—Hbn., Verzeichniss, 183, *Ecpantheria.*
1825—Hbn., Samml. Ex. Schmett., pl. 403, *Ecpantheria.*
1855—Wlk., C. B. Mus., Lep. Het., III., 689, *Ecpantheria.*
1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 523, *Ecpantheria*
1862—Harris*, Injurious Insects, 349, *Ecpantheria.*
1862—Clem., App. to Morris, Syn., 347, *Ecpantheria.*
1863—Saund.*, Proc. Ent. Soc., Phil., II., 28, *Ecpantheria.*
1863—Saund.*, Syn. Can. Arct., 22, *Ecpantheria.*
1864—Pack., Proc. Ent. Soc, Phil., III., 127. *Ecpantheria.*
1868—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 78, *Ecpantheria.*
1872—Riley*, 4th Rept. Ins. Mo., 141, ff. 63, 64, *Ecpantheria.*
1873—Stretch*, Zyg. & Bomb., 174, pl. 7, ff. 20 (♂) and 21 (♀), *Ecpantheria.*
1882—Saund*, Can. Ent., XIV., 113, f. 12 and 13, *Ecpantheria.*
1888—Slosson, Ent. Amer., III., 185, *Ecpantheria.*
oculana Fabr.

1775—Fabr., Syst. Ent., 564, *Bombyx*.
1781—Fabr., Sp. Ins., II., 177, *Bombyx*.
1787—Fabr., Mant. Ins., II., 112, *Bombyx*.
1791—Oliv., Enc. Meth., V., 44, *Bombyx*.
1793—Fabr., Ent. Syst., III., 1, 425, *Bombyx*.
1797—Sm. Abb., Ins. Ga., II., 137, *Phalæna oculatissima*.
1855—Wlk., C. B. Mus. I., 689, *pr. syn.*
oculatissima Sm. Abb.
1797—Sm. Abb*, Ins. Ga., I . 69, *Phalæna*.
1841—Duncan, Nat. Libr., X . 30, f. 4.
1864—Pack., Proc. Ent. Soc., I., 127, *pr. syn.*
cunegunda Cramer.
1782—Cram., Pap. Exot., IV., 104, pl. 344, f. D. E., *Phalæna*.
1805—DeB., Ins. Afr. et. Am., 134, 24, f. 4, *Bombyx*.
1865—Grt. & Rob., Ann. Lyc., N. VIII., 368, *pr. syn.*
var. *denudata* Slosson.
1888—Slosson, Ent. Amer., III., 212, *Ecpantheria*.
Habitat—Canada to Florida, to Texas, to California.
Food plant—Omnivorous.

I do not see why the term *oculana* Fabr. should not be restored for this species, but do not make the substitution lest there be some reason I have not yet discovered, to prevent it. Walker makes the reference, but retains the later name. Packard cites Walker, but does not refer at all to *oculana*, although *oculatissima* is referred to in the synonymy. Smith and Abbot refer to *oculana* as identical with their form, and also cite Cramer's figure of *cunegunda*, which also antedates *scribonia*.

E. sennettii Lint.
1884—Lintner, Papilio, IV., 147, *Ecpantheria*.
Habitat—Texas.

Genus NELPHE Boisd.

I do not know this genus at all, either autoptically or by description. The only described American species is :

N. carolina Hy. Edw.
1886—Edw., Ent. Amer., II., 166, *Nelphe*.

(To be continued.)

NOTES ON ARGYNNIS FREYA, CHARICLEA AND MONTINUS.

BY H. H. LYMAN, MONTREAL.

As is well known to readers of the CANADIAN ENTOMOLOGIST, Mr. Scudder, in his sumptuous work on the Butterflies of New England recently published, stated that Mr. Edwards had confused the two northern species, *Argynnis Freya* and *Chariclea*. This was denied by Mr. Edwards in the April number of this journal and Mr. Butler's authority was invoked to prove that Mr. Scudder had himself transposed these names. Here the matter rests, but as I think that I can throw some additional light on the question I shall endeavour to do so.

In the preface to Mr. Scudder's work he states that "twenty years ago the present work was definitely planned, announced and begun and the greater part of it has been written for fifteen years," though he adds that much of it was rewritten within the past few years.

On page X. of the same preface, in speaking of the appendix in which certain butterflies not found in New England are described, he says: "It was, however, an afterthought not entering into the original plan * * * * it has, indeed, been written during the printing of the work." This fact that the first volume was written fifteen or more years ago and the third only last year, no doubt explains the contradictory statements in reference to the affinities of *Argynnis Montinus* which appear in these volumes.

On page 604 of the first volume Mr. Scudder, in speaking of *A. Montinus*, says: "This species is certainly distinguishable from B. chariclea (Schneid), or B. chariclea boisduvalii (Somm.), both of which forms have been found by Mr. Couper on the northern shore of the Bay of St. Lawrence. Whether it should be looked upon merely as a geographical race, or as a species, is a question about which there may be easy difference." This certainly implies a very close connection between these forms, and in the original description of *Montinus*, in Scudder's "List of the Butterflies of New England," published in the Proceedings of the Essex Institute in April, 1863, reference to which he curiously enough omits from his recent work, he began his description with "Very similar to *A. Chariclea*."

So far so good, but on turning to the appendix in the third volume, page 1807, under the heading of *Brenthis freija* Thunb., which is the same as *Freya* Hübn., he says: "This species is very closely allied to

B. Montinus." Now, these two statements are quite irreconcilable, for while it is quite true that some so-called species stand so close together that a third may be quite correctly described as very close to both, this is certainly not the case with the species in question, which are very distinct. I think it will therefore be conceded that Mr. Scudder is wrong in one of these statements, and we can therefore proceed to examine which is erroneous, and I believe it will be found that in this case second thoughts were not best.

Both *Chariclea* and *Freya* occur in Europe and have been studied and illustrated by European entomologists. *Freya*, or *Freija*, is figured and described in Boisduval's *Icones*, p. 100, pl. 19, fig. 4, 5, and in the same work there is a description and figure (p. 98, pl. 20, fig. 5, 6) of *A. Boisduvalii*, which all the authorities that I have been able to consult, with possibly one exception, concede to be but a variety of *Chariclea*. Both of these references were omitted by Kirby from his catalogue and the former was overlooked by both Edwards and Scudder, but both are given in Strecker's catalogue. The figures in Boisduval's work, though inferior to those to which Messrs. Edwards and Scudder have accustomed us, are still sufficiently accurate to prove that it is truly *Chariclea*, as stated by Mr. Scudder in his first volume, to which *A. Montinus* is allied.

Mr. Scudder also makes the mistake of giving, doubtfully it is true, *M. Tarquinius* Curtis as a synonym of *A. Boisduvalii*, while all the other authorities give it as a synonym of *Freya*. From its description in the appendix to the "Narrative of Sir John Ross," it must certainly be very close to *Freya*, and is probably identical with it, but it has no connection with *Chariclea* or its variety, *Boisduvalii*. It thus appears that Mr. Scudder must have confused these species, and so transposed their names, a very curious mistake, and apparently similar to that which he formerly made in regard to *Phyciodes Harrisii* and *Nycteis*, to which I called his attention in 1878.

As there are doubtless many readers of this journal who are not familiar with these northern species of *Argynnis*, a few descriptive notes may not be out of place.

Chariclea may be described as somewhat like *Myrina* upon the upper side, though the markings are heavier, especially upon the secondaries, and it is rather more deeply shaded at the bases of the wings. There is, however, a very striking difference in the fact that in *Chariclea* the cres-

cent-shaped markings on the hind wings open outwards, while in *Myrina* they are much lighter and open inwards. There is, of course, no similarity between these species on the under side.

Freya is strikingly different from *Chariclea* upon both the upper and the under surfaces. Above the colour is duller and the bases of the wings are very heavily shaded; in fact, in the case of the secondaries, this shading extends over nearly the half of the wing. In *Chariclea* the black so-called mesial band is composed of a series of almost straight bars placed rather irregularly, while in *Freya* it is made up of a series of deep lunules. A like difference may be observed on the secondaries, but it is not quite so marked. On the under side of primaries similar differences are observable, although the markings are lighter; but the under side of secondaries show the most marked differences, for the beautiful band of pearly lunules crossing the wings just outside of the mesial black band in *Freya* has no counterpart in *Chariclea* and the course of the black band in its deep lunules is also very distinct.

There are many other points of difference between these species, but it is not very easy to indicate them clearly without going into a tedious description.

Mr. Scudder's descriptions of these species being reversed, what he says of *Freija* belongs really to *Chariclea*, and *vice versa*. These descriptions are given in great detail and are generally correct, but contain several curious errors. For instance, in describing the primaries of his *Freija*, but really *Chariclea*, he says: "Within the mesial band are three narrow transverse bands crossing the cell, the innermost not reaching the median nervure; within these is a small lunule opening outward." Surely he should have said inward, as the concave side of the lunule is towards the base of the wing. I might also allude to the fact that he says that the mesial band starts "a little beyond the middle of the costa"; as it really starts at a point very nearly two-thirds from the base of the wing I consider his statement rather loose for a man as particular as Mr. Scudder is known to be. Similarly in describing *Freya*, or *Freija*, he says that the black mesial band of primaries starts at the middle of the costa, while it is really not less than three-fifths from the base. In describing this form he omits to mention the small lunule inside the three bars crossing the cell, though it is recognizable, at least in my specimens, in spite of the heavy shading just inside of it, and he also fails to observe that the

black mark below the first divarication of the median nervure is angulated in a similar manner to that in the other species. But the most curious statement is that which he makes in speaking of the underside of primaries, where he says that "the sagittate spots are more delicate, and the nervules beyond them are distinctly yellowish or white," whereas these yellowish or white lines are o[illegible]ming the centres of the interspaces and not on the nervule

There are other slips in the[illegible]ptions, but mention of these is sufficient to show that Mr. Sc[illegible]iptions, though laboured, are not always quite accurate. Mr. Scudder also speaks of these species as flying—one in May, or early in June, and the other late in August, or early in September. At Laggan, however, where my specimens were collected by Mr. Bean, the difference of seasons was not so marked, as *Freya* was obtained May 11th and 16th, and *Charielea* June 29th to July 18th. The latter occurs, however, later than this, and is doubtless found up to the end of August.

ON THE LISTS OF COLEOPTERA PUBLISHED BY THE GEOLOGICAL SURVEY OF CANADA, 1842–1888.

BY W. HAGUE HARRINGTON, OTTAWA.

(Continued from page 160, Vol. xxii.)

SCARABÆIDÆ.

Onthophagus Hecate *Panz.* A.O., W., S.M.
Aphodius fossor *Linn.* St.L.
validus *Horn.* W.
fimetarius *Linn.* A.O., St.L., T.L.
ruricola *Melsh.* W.
fœtidus *Fab.* T.L.
pectoralis *Lec.* B.C.
granarius *Linn.* S.M.
leopardus *Horn.* Y.F., N.O., O.
Geotrupes Egeriei *Germ.* A.O.
Dichelonycha subvittata *Lec.* A.O., St.L.
Backii *Kirby.* B.C., M.
Serica tristis *Lec.* S.M.

Diplotaxis brevicollis *Lec.* B.C.
Lachnosterna fusca *Fröh.* L'O., St.L., B.C., S.M.
Osmoderma eremicola *Knoch.* L'O.
scabra *Beauv.* A.O.
Trichius piger *Fab.* A.O.
affinis *Gory.* N.O., W., S.M., O.K.

SPONDYLIDÆ.

Spondylis upiformis *Mann.* B.C.

CERAMBYCIDÆ.

Orthosoma brunneum *Forst.* (unicolor *Drury).* L'O.
Asemum atrum *Esch.* B.C.
Criocephalus agrestis *Kirby.* N.C., Y.F., C.L., S.M, O., N., C.R.
Tetropium cinnamopterum *Kirby.* O.
Gonocallus collaris *Kirby.* C.R.
Hylotrupes ligneus *Fab.* [Physocnemum]. St.L., O.
Phymatodes dimidiatus *Kirby.* B.C.
Merium proteus *Kirby.* B.C., Y.F., N.O., C.L., O., N., C.C., C.R.
Xylotrechus undulatus *Say.* N.C., N.O., C.L., S.M., O, N., C.R.
Neoclytus muricatulus *Kirby* [leucozonus *Lap.*]. N.O.
Desmocerus palliatus *Forst.* S.M.
Encyclops cæruleus *Say.* A.O.
Rhagium lineatum *Oliv.* O.
Pachyta monticola *Rand* (Evodinus). A.O.
liturata *Kirby.* B.C., C.L., N.
Achmæops proteus *Kirby.* A.O., N.O., O., C.R.
pratensis *Laich.* N.C., N.O., S.M.
Leptura subargentata *Kirby.* B.C., N.C.
var. similis *Kirby.* N.O.
sexmaculata *Linn.* N.C., O., C.R.
nigrella *Say.* C.R.
canadensis *Fab.* A.O., O.K.
chrysocoma *Kirby.* N.C., S.M.
proxima *Say.* A.O.
vittata *Germ.* A.O.
pubera *Say.* A.O., S.M.

mutabilis *Newm.* A.O.
aspera *Lec.* S.M.
Monohammus maculosus *Hald.* S.M.
scutellatus *Say.* A.O., St.L., N.C., Y.F., N.O., S.M., M., H.M., M.F., O.K., O., N., C.R.
race oregonensis *Lec.* B.C.
confusor *Kirby.*
marmorator *Kirby.*
Pogonocherus penicellatus *Lec.* H.M., O.K., O.
mixtus *Hald.* N.C.
Saperda vestita *Say.* L'O.
tridentata *Oliv.* A.O.

CHRYSOMELIDÆ.

Donacia pubicollis *Suffr.* O.K.
palmata *Oliv.* A.O.
hirticollis *Kirby.* C.L., M.F., N.
magnifica *Lec.* C.L., C.C.
proxima *Kirby.* N.O., C.L., M.F., C.C., R.A.
subtilis *Kunze.* A.O., C.L., H.M., C.C., R.A.
æqualis *Say.* O.K.
cuprea *Kirby* [pusilla *Say.*]. A.O., T.L., N.
aurea [? misprint for aurifer *Lec.*, =*var.* cuprea]. M.F.
flavipes *Kirby.* A.O., T.L.
Orsodacna atra *Ahr.* [Childreni *Kirby*]. B.C., N.C.
Syneta ferruginea *Germ.* [tripla *Say*]. A.O., B.C.
Cryptocephalus 4-maculatus *Say.* C.C.
Adoxus obscurus *Linn.* [vitis *Fab.*]. A.O., B.C., N.C., O.K., N.
Chrysochus auratus *Fab.* A.O., S.M.
Graphops marcassita *Cr.* S.M.
Entomoscelis adonidis *Fab.* B.C.
Prasocuris Phelandrii *Linn* [Helodes trivitta *Say*]. L'O.
varipes *Lec.* S.M.
Doryphora clivicollis *Kirby* [Chrysomela trimaculata *Fab.*]. L'O.
10-lineata *Say.* S.M.
Chrysomela scalaris *Lec.* A.O., St.L.
philadelphica *Linn.* S.M., T.L.

var. spirææ *Say.* A.O., N.C.
multipunctata *Say*, *race* verrucosa *Suffr.* B.C.
Plagiodera oviformis *Lec.* B.C.
Gastroidea polygoni *Linn* [Gastrophysa]. W.
cyanea *Melsh* [Gastrophysa] W., N.
Lina lapponica *Linn* [Plagiodera interrupta *Fab.*]. A.O., B.C., C.L., O.K., C.R., *var.*
scripta *Fab.* O.K.
Gonioctena arctica *Mann.* N.C.
pallida *Linn* [rufipes *DeG.*]. B.C., Y.F., N.O., O., N.
Phyllodecta vitellinæ *Linn.* A.O.
Phyllobrotica decorata *Say.* A.O.
Galeruca sagittariæ *Gyll.* A.O., B.C. *? var.*, N.O., C.L., H.M., O.K., O., N., C.C.
Hypolampsis pilosa *Ill.* C.L.
Oedionychis lugens *Lec.* B.C.
scripta [? misprint for scripticollis *Say* =*var* vians *Ill.*]. C.L.
Disonycha collaris *Fab.* [Haltica]. L'O.
Haltica bimarginata *Say* [Graptodera]. B.C., N.C., N.O., M.F.
evicta *Lec.* [Graptodera]. B.C.
Crepidodera mancula *Lec.* B C.
Systena frontalis *Fab.* A.O.
Chelymorpha argus *Licht.* [cribraria *Fab.*]. L'O., W.

TENEBRIONIDÆ.

Phellopsis porcata *Lec.* B.C.
Coniontis ovata [? misprint for ovalis *Esch.*]. B.C.
Eleodes cordata *Esch.* B.C.
Nyctobates pennsylvanicus *DeG.* (Ipthimus). L'O.
Ipthimus opacus *Lec.* S.M.
Upis ceramboides *Linn.* (reticulatus *Say*). A.O., St.L., B.C., C.L., S.M., O.K., O., N., C.C., R.A.
Tenebrio molitor *Linn.* L'O, N.O., W., S.M.
tenebriodes *Beauv.* S.M.
Blapstinus moestus *Melsh.* S.M., H.M.
interruptus *Say.* S.M.
Hypophlœus punctatus [misprint ?]. B.C.
Boletotherus bifurcus *Fab.* (Bolitophagus cornutus *Pz.*). A.O.

CISTELIDÆ.

Isomira quadristriata *Coup.* S.M.
Hymenorus pilosus *Melsh.* S.M.

LAGRIIDÆ.

Arthromacra ænea *Say.* S.M.

MELANDRYLIÆ.

Penthe obliquata *Fab.* M.F.
Serropalpus barbatus *Schall.* [substriatus *Hd.*]. St.L., O.
Stenotrachelus arctatus *Say.* N.C., M.F., O.

PYTHIDÆ.

Crymodes discicollis *Lec.* B.C.

CEPHALOIDÆ.

Cephaloon tenuicorne *Lec.* B.C.

MORDELLIDÆ.

Mordellistena vitis [? misprint for vilis *Lec.*]. B.C.
nigricans *Melsh.* A.O.

ANTHICIDÆ.

Corphyra lugubris *Say.* S.M.
collaris *Say.* (Pedilus). A O.

MELOIDÆ.

Meloe angusticollis *Say* (rugipennis *Lec.*) A.O., St.L., N.
americanus *Leach.* N.C.
Macrobasis unicolor *Kirby.* S.M., O.K.
Cantharis cyanipennis *Say.* B.C.

OTIORHYNCHIDÆ.

Evotus naso *Lec.* B.C.

CURCULIONIDÆ.

Sitones flavescens *Marsh.* (lepidus *Gyll.*). A.O.
Trichalophus alternatus *Say.* B.C.
Lepyrus gemellus *Kirby.* N.
colon *Linn.* B.C., N.G.

Pissodes strobi *Peck.* H.M.
costatus *Mann.* B.C.
dubius *Rand.* H.M.
Hylobius pales *Hbst.* A.O., S.M., O., C.R.
confusus *Kirby.* S.M.
Hypomolyx pineti *Fab.* [pinicola *Coup.*]. A.O. (near pineti), O., N., C.R.
Lixus caudifer *Lec.* B.C.
Dorytomus laticollis *Lec.* B.C.
Acalyptus carpini *Hbst.* Y.F.
Baris confinis *Lec.* S.M.

CALANDRIDÆ.

Dryophthorus corticalis *Say.* S.M.

SCOLYTIDÆ.

Xyloterus bivittatus *Kirby.* T.L.
Dryocœtes septentrionis *Mann.* B.C.
Dendroctonus rufipennis *Kirby* [obesus *Mann.*]. B.C.

ANTHRIBIDÆ.

Gonotropis gibbosus *Lec.* C.C.

Report of Progress, 1882–83–84, p. 62d.

List of Coleoptera collected by J. R. Spencer, at Fort Churchill, (determined by Mr. J. B. Smith for Mr. James Fletcher, 14 species).

Carabus chamissonis *Fisch.*, var. baccivorus *Fisch.*
Pterostichus hudsonicus *Lec.*
Amara hyperborea *Dej.*
similis *Kirby.*
Agabus [Gaurodytes] griseipennis *Lec.?*
Colymbites sculptilis *Harr.*
Dytiscus dauricus *Gebl.* [confluens *Lec.*].
Cryptohypnus abbreviatus *Say.*
Criocephalus obsoletus *Rand.*
Neoclytus conjunctus *Lec.*
Pachyta liturata *Kirby.*
Acmæops proteus *Kirby.*

Two species unknown to Mr. Smith.

Annual Report (new series), Vol. I., 1885, p. 26dd.

List of Coleoptera collected in 1885, by Dr. Robert Bell, in connection with the Hudson's Bay expedition, (determined by Dr. G. H. Horn for Mr. W. H. Harrington, 10 species).

Stupart's Bay.

Amara hypoborea *Dej.* Ov[illegible]mens.

Pterostichus hudsonicus *Lec.*

Hydroporus longicornis *Sharp.* Occurs in Europe.

perplexus *Sharp.*

Agabus dissimilis *Sahlb.* [longulus *Lec.* ?]. Fifty specimens.

After the list was printed, Dr. Horn sent specimens of this species, which he had referred with doubt to *longulus* Lec., to Dr. Sharp, who determined them to belong to *dissimilis* Sahlb.

Cape Chudleigh.

Nebria Sahlbergi *Fisch.*

Amara hyperborea *Dej.*

Lepyrus colon *Linn.*

Cape Digges.

Amara hyperborea *Dej.*

Agabus dissimilis *Sahlb.* [longulus *Lec.* ?].

Criocephalus agrestis *Kirby.*

Blanc Sablon.

Nebria Sahlbergi *Fisch.*

Pterostichus Luczotii *Dej.*

Quedius sublimbatus *Mäkl.*

Annual Report (new series), Vol. III., p. 75j.

List of Coleptera taken on the South Coast and Islands of James Bay, by Mr. J. M. Macoun, in 1887, (determined by Mr. James Fletcher, Dominion Entomologist, 21 species).

Cicindela 12-guttata *Dej.*

Calosoma frigidum *Kirby.*

Chlænius sericeus *Forst.*

Silpha lapponica *Hbst.*

Buprestis maculiventris *Say.*

Asemum mœstum *Hald.*

Criocephalus obsoletus *Rand.*

Xylotrechus undulatus *Say.*

Rhagium lineatum *Oliv.*
Pachyta liturata *Kirby.*
Acmæops proteus *Kirby.*
Leptura chrysocoma *Kirby.*
Monohammus scutellatus *Say.*
Orsodacna atra *Ahr.*
Adoxus obscurus *Linn.* [vitis *Fab.*].
Lina lapponica *Linn.*
Gonioctena pallida *Linn.*
Upis ceramboides *Linn.*
Lepyrus colon *Linn.*

P.S.—Line 18, page 155, should read longulus *Lec.* [Gaurodytes]. Y.F.

BOOK NOTICE.

THE PHYCITIDÆ OF NORTH AMERICA, BY GEO. D. HULST.

This valuable paper forms number 2, volume 17, of the Transactions of the American Entomological Society. The author not only gives us what has been done on this family by others, but also the results of his own critical and long continued study and investigation.

He complains of difficulties in the study of these insects owing to the fact that so many of the types are in European museums, and further, that so many are in private collections. There may be some question whether this last is not an advantage, for, as a rule, private collections are more easily accessible than public ones, and the visitor is not hampered by stringent rules. There is but little use to attempt the study of microlepidoptera in a museum where the rules forbid the removal of an insect from the trays, as is the case in many.

The Phycitidæ are given family rank " in the super-family Pyralidæ," and after the family characters, the literature of the subject is quite fully and very fairly given, which is always a difficult task. Mr. Hulst divides the family into two sub-families, based on the presence or absence of the lower anal plate, and differs from Ragonot, who divides them on the development of the tongue. From my own studies I am inclined to agree with Mr. Hulst.

The structure of the imago is treated thoroughly and exhaustively.

This part of the work is a model worthy of imitation by other systematic writers. When all our insects have been studied in this careful manner and then monographed, we shall have a sound basis for further work.

A vast field is open for future investigation on the early stages of these insects, and undoubtedly our economic entomologists will, in time, give us much valuable informatio on now that the way is made clear.

The author states that he "takes little interest, comparatively, in the guesses which are made of the ancestry of any group of the Lepidoptera." I am greatly surprised that he should decline to enter upon this fashionable field of conjecture. A person may as well be out of the world as out of fashion!

There are given synopses of the sub-families and of the genera, and under each genus is a synopsis of the species. A valuable feature is the giving of the type under each genus and the full synonomy. A list of undetermined species is also given with the original descriptions. Seven of these are Walker's species and the remaining three were published by Clemens. It would have been a great satisfaction if Mr. Hulst had given us the correct pronunciation of the generic names, especially those of Indian origin, for some of us may forget our Latin so far as to pronounce some of them incorrectly.

Under Notes on other Species, p. 221, by a slip it is stated that *Nephopteryx intractella* Walk. is a synonym of *Blepharomastix ranalis* which is itself a synonym of *Botis similalis* Guen. As the information went from me, and I may have made the slip myself in writing, I take this occasion to correct and say that *Nephopteryx intractella* Walk. is a synonym of *Nymphula similalis* Guen., and is given in Grote's Check-List under the name of *Eurycreon rantalis* Guen. See Ent. Am., Vol. 5, p. 211.

At the end is given a catalogue of the Phycitidæ of North America, comprising 71 genera and 201 species, followed by three plates of structural details.

On the whole this is one of the most satisfactory papers on the micro-lepidoptera I have ever seen, and it is "devoutly to be wished" that Mr. Hulst will immediately take up the *Geometridæ* and treat them in as thorough and complete a manner as he has the *Phycitidæ*.

C. N. FERNALD.

Mailed September 11th.

The Canadian Entomologist.

VOL. XXII. LONDON, OCTOBER, 1890. No. 10.

PROCEEDINGS OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Club assembled in the State House at Indianapolis, Ind., on Wednesday, August 20th, 1890, and began its regular sessions at 9 o'clock a. m., the President, Prof. A. J. Cook, Agricultural College, Mich., in the chair.

There were present during the meetings :—W. B. Alwood, Blacksburg, Va.; Geo. F. Atkinson, Columbia, S. C.; W. S. Blachley; P. Carter; Prof. E. W. Claypole and K. B. Claypole, Akron, Ohio; F. S. Earle, Ocean Springs, Mich.; S. G. Evans, Evansville, Ind.; James Fletcher, Ottawa, Ont.; H. Garman, Lexington, Ky.; Mrs. O. Hanney; C. W. Hargitt, Oxford, Ohio; Thos. Hunt; John Marten, Albion, Ill.; Miss Mary E. Murtfeldt and Miss Augusta Murtfeldt, St. Louis, Mo.; W. W. Norman; Prof. Herbert Osborn and L. H. Pammel, Ames, Iowa; R. S. F. Perry; C. Robertson, Carlingville, Ind.; Prof. J. W. Spencer, Athens, Ga.; James Troop and Prof. F. M. Webster, Lafayette, Ind.; Dr. Clarence M. Weed, Columbus, Ohio, and others.

The President, Prof. A. J. Cook, delivered the following address :—

ON TEACHING ENTOMOLOGY.

Ladies and Gentlemen of the Entomological Club,—I congratulate you that another year has passed, and our number has not been broken in upon by death. While our ranks have been much enlarged, no one has been called to that undiscovered country from whose bourne no traveller returns. I also congratulate you upon the great increment in our force of working entomologists. I think I may say, with no fear of contradiction, that no year in the history of America has been so remarkable in this respect as has the last. This is a cause for special felicitation, not only to entomologists, but to all our people. Ours is a tremendous country—by ours I include, of course, our Canadian brothers, for we, as scientists, know no line of separation—and to spy out the entire land needs an army of workers or observers, all trained to keen sight and

ready apprehension. But more than this the magnitude of our country is fully equalled by the magnitude of the insect hosts, and to know all of these, with their full life history, requires an incalculable amount of closest research. But our business economy demands this for all our species: for so wonderful is the balance of nature, so close the relations of all species of life, that really we may hardly divide insects into those important and those unimpo icultural economy. All are important; and so from an s than a scientific standpoint, it is desirable that all such lely encouraged, and it is a most hopeful omen—the ra earnest and trained workers. I shall not in this address o giving the peculiarities of the season in respect to insects, n attention to interesting discoveries, like the importation *a cardinalis*. All these will be brought out in papers and I must, however, refer to the new association for the advan omic entomology, which was organized at Toronto a year ch held its first meeting at Washington last November. This meeting, under the Presidency of Dr. Riley, was a valuable one; and that society promises much for the science of entomology, as well as for its economic development. It is also a matter of much interest that a new paper—"Insect News"—is started at that great centre of entomology—Philadelphia—which will also do much every way for our science. This, with the very excellent periodical "Insect Life," published by the Entomological Division of the Department of Agriculture, can but give new impetus to entomological research. In addition to these, we have an addition to Prof. Comstock's admirable work, which, when completed, will form a most valuable adjunct in the development of entomology. If we may judge from what we already have, this will be invaluable in every entomological laboratory. When the Society of Economic Entomologists was organized a year ago it was remarked by one of our first entomologists that that move sounded the death-knell of this Club. I then remarked that such ought not to be the case. That Society is to be composed only of those interested in economic entomology, and of course will only put emphasis in the direction of the practical aspects of the science; this more or less of entomologists in a wider sense, and so will include those interested in practical entomology and also in the science without relation to utility. The Club then may well continue. I believe it will live and thrive, and

will be most helpful to entomologists and to our science. While the other Association will discuss economic questions, this Club will place no limit on either its discussions or its membership, only so far as entomology shall be its aim and purpose. No one doubts but that he who has a thorough training in the science of entomology will be far better prepared for practical work, and so there can be only the most cordial relation between the Association of Economic Entomologists and this Club. Indeed, many of our most active entomologists will be members of both. I have already stated the truism that only can he do the best practical work in entomology who is thoroughly well grounded in the general science of entomology. As we now have a great call for entomologists in our experimental stations, agricultural colleges, and as State entomologists, not to speak of the fact that every farmer and fruit-grower would be more successful if he were well informed in this science, it goes without saying that there ought to be in training men for just such work. It seems to me that it needs no argument to show that our agricultural colleges are just the places where this training should be given. They were founded to teach those subjects which would be most serviceable on the farm. Entomology is one of the chief of these. Thus it follows that every student of agriculture should have a thorough course in this science, with the practical aspect of the subject kept in the foreground. In thus presenting this science to large classes — I have from thirty to forty each year who study this subject in the course—the teacher will find some in each class who are specially fitted to succeed. They enjoy the study and work most earnestly just for the love of the pursuit. They have quick observation, and are very accurate and honest in all their work. It needs no prophet to bespeak success in this field for such students. Our agricultural colleges are just the places to discover the men who have great possibilities in this direction; just the places to give the training that shall best fit men to do the most valuable work. It will be my purpose in the remainder of this address to describe the equipment for such work, and to explain the method which I believe will give the best results. Of first importance is a good library; this should contain all the standard works, periodicals and monographs, so that students who may decide to study any insect or genus, may find what has been written on the subject. Of course this cannot be had at once, but it is so essential

that no effort should be spared to build up a complete entomological library at the earliest possible moment. *True*, the scientist should study *things*, not books, but he will find a wide use of books most helpful in his study. Next to a library, such colleges should have good collections, which are often of more value than the library. A small show collection, illustrating the families and orders, and the several stages of the most injurious species of the p the groups of beneficial ones should be open to the pub e studied and appreciated by the practical farmer, who, a: llege, will find it helpful, and will also interest and stimu lass men, who will thus have their attention called towar e they commence the regular study, which will not occur till l along in the course. Drawing, botany, microscopy, and German, if thoroughly understood, will be great aids to who commences the study of entomology. Thus this stud e in the course and the show collection will be whetting the appet the under-class men from the time they enter college until they commence the study. I would also have what I call a student collection—this is a pretty full collection from the locality of the college. This I would hang upon the wall of the lecture room, which I would have dark, except when in use, so as to preserve the colour of the specimens. I would have this in rather small cases, with glass in front and also back where it is desirable, as in case of Diurnals, to study both under and upper sides of the wings. This collection should show at least types of each group in all stages, from egg to imago, as well as nests, cocoons, etc. This is an object lesson ever before the student, is ever ready for use by the teacher to illustrate his lecture, and is at the disposal of the students in naming their own collections or in closer study of any group. It seems to me such a collection should be in every college. Lastly, I would have a laboratory collection which should be a biological collection, and the fuller the better. This is in large, tight, glass-faced drawers. I use the Harvard case. This is for the use of teachers and post-graduates who desire to study further in the science. It is too valuable for general use by the student or to be kept to satisfy general curiosity.

"THE COURSE OF STUDY."

As I have before remarked, before the student commences the study of insects he should have had a good course in free-hand drawing, should

have had instruction in the use of the microscope and in preparing microscopic specimens and slides, and if he has a ready use of German and French it will be very helpful to him in his study. It is also desirable that the student should have had a full course in botany. The students of our college have had three terms of botany, one devoted entirely to microscopic botany, before they begin the study of entomology. I consider this very valuable preparatory work. Entomology is very close precise work, and the laboratory work if carried on for a less space than three hours at a time is not satisfactory. But three hours of such close work is very wearying unless the student has had a fitting preparation. Thus I am pleased that our students have had *vertebrate dissection* with human and comparative anatomy and physiology before they commence entomology. I know this seems the reverse of the natural method; as nature proceeds from lower to higher; vertebrate dissection is lighter and less trying to eye and brain than is the study of insect anatomy; thus I am pleased to have Anatomy and Physiology of Vertebrates precede that of the Arthropoda in our course. In our College the student attends a course of sixty lectures on the anatomy and physiology of insects, systematic entomology and the economic bearing of the subject. These lectures are illustrated by use of models, the student's collection of insects, already referred to, by microscopic preparations, mostly prepared at the College, and elaborate charts and drawings also prepared specially for our use. In connection with this course there are 36 hours of laboratory. Each student works three hours one day each week for twelve weeks. In this time they are able to study the internal anatomy, and to examine carefully and accurately one insect of each order. In connection with this several insects are traced to the genus by such keys as Leconte and Horn, Cresson, Williston, etc. Besides the above, each student makes a collection of from ten to twenty-five insects of each order, all neatly put up with date and locality label; each order by itself and all labelled as far as time will permit. Many students succeed in naming a large number of their specimens. Each student is also required to mount insects in all the approved ways. Small insects mounted on triangular pieces of cardboard or rectangles of cork with silver wires, while the larvæ are put in bottles of alcohol with rubber corks and also prepared by eviscerating and drying, while distended with air, in a heated oven. The students are also encouraged to prepare biological collections, in

which they preserve the eggs, larvæ after each moult, pupa, cocoon, imago of both sexes, and of various sizes and the several variations. Some of our most enthusiastic students work out several such life histories, describing not only the separate stages, but the several parasites that work to destroy the insects. I regard this work as very valuable. It is excellent discipline for the mind and observation, gives accurate information of the most interestin[g] [s] enthusiasm for the study as nothing else can. It is su[ch] that will tell for the future of entomological research, tha[t] [o]mologists, who will honour alike the fields of pure and [a]logy. But such study ought not and will not stop here. [Th]ey will avail themselves of the opportunities which such lab[o]r Last winter during our long vacation—ours is an agricu[l]tural [a]nd our vacations must needs occur in winter, when farm o[p]erations [a]rgely at a standstill—I had ten special students of ento[m]ology [in] laboratory, one from South Dakota, one from Indiana, [one] [f]rom, one from Japan, one from Wisconsin, and the others from our own State. Nearly all were college graduates. Six special students, all graduates from colleges, have spent the year in my laboratory in special entomological study as post-graduate students. It seems to me that such are the young men who are going to develop the entomology of our country. They are the young men who can and will do grand work in our colleges and experimental stations. These young men each take up some special family or genus of insects, to which they give the major part of their time and study. They collect in all orders and give special attention to biological work, tracing the life histories of insects, identifying as far as possible the insects they capture and try to become familiar with entomological literature, so far as they are able. The students are mutually helpful to each other. As the laboratory may be said to be a sort of perpetual Natural History, or more accurately Entomological Society, thus the students become familiar with the general laboratory work, in fact, they each become a factor in some degree of carrying the work forward. Here I will close by explaining briefly the mode of our labaratory work, which differs in some degree from the admirable plan which Prof. Forbes explained at the Washington meeting of Economic Entomologists last November. Our labels give in compact space locality, date, accession and species number. The accession number agrees with a number—serial number—in our accession catalogue for the special year. Thus, ac. 400 shows that the insect or

insects bearing that label were the 400th collected during that season. The sp. number is given as the insect is determined, and is the number of the insect in the catalogue which we use. Thus, sp. 25 is "Cicindela purpurea," as the beetle is numbered 25 in Henshaw's catalogue of Coleoptera. In case the catalogue is not numbered, as is the case with Cresson's list of Hymenoptera, then we number it. We have a column in our accession catalogue for date, collector, person who named the specimen, and also for remarks. This last column is wide, and in it we can usually write all necessary information which we received in the collecting. If we are experimenting with or studying the insect, our notes are kept on cards. These are numbered to agree with accession catalogue, and are kept in serial order until we know the species when we add the species number as well. We now index the card and place it in its correct alphabetical position in our card collections. Thus we can very easily find our notes on any specimen, either by accession number or by the name of the species. This plan works well, and, it seems to me, is very economical in respect to time. Of course our students all see this scheme and become familiar with its workings.

Dr. C. M. Weed had listened with much pleasure to the President's address and approved of most of the points brought forward. He considered a knowledge of French and German of the utmost importance from the frequent necessity of consulting works in those languages when working up the life-histories of insects. He did not, however, like the label submitted by Prof. Cook, thinking that it entailed too great an expenditure of time. He had adopted Prof. Forbes's system of labelling, and had found that it answered all purposes.

Prof. Herbert Osborn approved very highly of the course of instruction in entomology outlined in the address.

Dr. C. M. Weed then read a paper upon the life-history of the evening primrose curculio (*Tyloderma foveolatum*) which he had bred from the stems both of Œnothera and Epilobium in large numbers.

Prof. F. M. Webster had listened to the paper with much interest; as stated by Dr. Weed he had given some study to the insect in question, and was pleased to hear these further observations. He had found that when a plant was infested the beetle occurred in all its stages, and that those near the base were always further advanced towards maturity.

The meeting adjourned.

(To be continued.)

ON THE FOOD-HABITS OF NORTH AMERICAN RHYNCHOPHORA.

BY WM. BEUTENMULLER, NEW YORK.

In the present paper I have attempted to bring together all the Food-Habits of North American Rhynchophora (except the Scolytidæ) that have been placed on re- ...us entomological publications, with the addition of my ... ...ons on the subject.

Eugnamptus collaris a... ...s I have found plentifully upon the foliage of hickory and ...

Rhynchites bicolor may ... ...rious species of wild roses.

Pterocolus ovatus I ha... ... live oak trees at Kissimmee, Florida, May, 1887.

Attelabus bipustulatus ... ...olling up the leaves (Murtfeldt, CAN. ENT., IV., p. 143). ... *A. nigripes* also live on oak. The latter species I have b... ... oak at Kissimmee, Florida, in April.

Graphorhinus vadosus feeds in the imago state on the leaves of clover, according to Mr. F. M. Webster (Am. Nat., 16, p. 746).

Epicærus imbricatus, according to Dr. C. V. Riley, is injurious to apple and cherry trees and gooseberry bushes, by gnawing the twigs and fruits; also said to be found on onions, radishes, cabbage, beans, watermelons, cucumbers, beets, squashes and potato, etc.

Exomias pellucidus. I have first taken this European beetle at Astoria, L. I., in the year 1884, and again on Staten Island in 1886. In Europe it lives on the strawberry. The food plant in this country has not yet been detected. (See Ent. Am., III., p. 188.)

Ophryastes vittatus is chiefly found on "greasewood," as is also *O. sulcirostris* and *O. latirostris*, according to Mr. Wickham (Ent. Am., V., p. 77).

Panscopus erinaceus occurs on wild grape. (Schwarz, Bull. Bklyn. Ent. Soc., VII., p. 84.)

Diamimus subsericeus was taken around the roots of cottonwood by Mr. Wickham (l. c., p. 78).

Otiorhynchus sulcatus. This European species is destructive to a variety of horticultural plants. In the larval stage it attacks the strawberry, devouring the roots. *O. ovatus* also infests the roots of this plant.

Aragnomus griseus was recorded by Dr. C. V. Riley as an enemy to pear trees in Oregon. (Insect Life, Vol. I., p. 16.)

Pachnæus opalus is injurious to the orange in Florida. *P. distans* feeds on oak. (Riley, Am. Nat., 16, p. 916.)

Tanymecus confertus appears to be polyphagus, without preference for any particular plant. (Riley, l. c.)

Anametis grisea in the larval stage lives under the bark of apple and pear. (Riley, l. c.)

Pandeletejus hilaris lives in the trunk of the white oak. (Harris, Inj. Ins., p. 70), also found on beech trees by Mr. F. M. Chittenden.

Brachystylus acutus is only found on the persimmon. (Riley, l. c.)

Neoptochus adsperus feeds on oak. (Riley, l. c.)

Artipus floridanus is injurious to the orange. (Riley, l. c.)

Aramigus tesselatus, according to Mr. E. A. Popenoe, infests the sweet potato. (Industrialist, May 29th, 1886.)

Aramigus Fulleri feeds on the roots of roses. (Riley, Rep. Dept. Agricul., 1878.)

Aphrastus tæniatus lives on the paw-paw. (Riley, l. c.)

Scythropus elegans is found on the pine, according to Mr. W. H. Harrington. (Trans. Ottawa Field Nat. Club, Vol. I., No. 2, p. 33, 1881.) Mr. F. H. Chittenden also found the insect in abundance on pine *(P. strobus)* at Ithaca, N. Y.

Eudiagogus pulcher and *E. Rosenschœldi* both feed on *Cassia occi dentalis* and *C. obtusifolia*. The former species I have found in large numbers at Enterprise, Fla., in May.

Sitones lineellus and *S. flavescens* are injurious to the clover and lucerne in Europe. *S. hispidulus* also lives on the roots of clover.

Plinthodes tæniatus I have beaten from small alder bushes in the Orange Mts., New Jersey. Whether the species lives on this plant I am unable to say.

Ithycerus noveboracensis is found on white and burr oaks. The larva bores in the tender twigs. I have also found the insect on hickory. Mr. W. H. Harrington found it on beech trees. (Rep. Ent. Soc., Ont., p. 52, 1880.)

Apion herculanum occurs on the flowers of *Viburnum acerifolia*, according to Dr. Hamilton. (CAN. ENT., 20, p. 67).

Apion rostrum infests the seed pods of wild indigo *(Baptisia tinctoria)*.

Apion nigrum sometimes depredates the leaves of locust (*Robinia pseudacacia*). *A. fraternum* was observed upon two species of *Lespedeza* by Mr. F. H. Chittenden. *A. segnipes* was obtained from the seeds of a species of *Astragalus* by Say. (Le Conte, Ed., p. 265.)

Podapion gallicola makes a spherical or ovoid gall on pine (*Pinus inops*), Riley. (Bull. Bk[illegible]L., p. 61.) I have also found the galls in the vicinity of [illegible]C., last June.

Phytonomus punctatus [illegible]ves of clover. I have found it in abundance on timothy g[illegible] *P. nigrirostris* also feeds on clover and *Buphthalmum* [illegible]. *P. comptus* lives on *Polygonum*, and *P. eximius* on *Rumex*. ([illegible]ept. Agricul., 1881–82, p. 171.)

Listronotus latiusculus wa[illegible]r. C. M. Weed in all stages in the stalks of *Sagittaria va*[illegible]. F. M. Chittenden found *L. tuberosus*, *L. caudatus* and *L*[illegible]*us* while sweeping a small patch of aquatic plants composed [illegible] *Sagittaria* and a species of *Carex*. *L. appendiculatus*, it is said, was found by Mr. William Julich breeding in the lower parts of the stems of some species of reed. I have also taken two species of *Listronotus* on the flower heads of *Sagittaria* at Shingle Creek, Kissimmee, Florida, April.

Pissodes strobi is sometimes very destructive to the white pine. The larva and imago were first figured by Peck, in 1817. (Mass. Agricul. Reposit., IV., pp. 205, 211, pl. 1.) *P. affinis* is also found on the pine.

Pachylobius picivorus is placed by Mr. W. H. Harrington in a list of insects found on pine (Trans. Ottawa Field Nat. Club, I., p. 33).

Hylobius pales lives in pine trees beneath the bark, burrowing into and destroying the inner surface of the bark, and the tender newly formed wood, often doing great damage to pine forests.

Lixus rubellus has been observed in considerable numbers clinging to the leaves and blossoms of *Polygonum amphibium*. (Webster, l. c.)

Lixus parcus is said by Dr. Riley to form galls in the stems of *Amelanchier*. (Proc. Ent. Soc., Wash., I., p. 33.)

Lixus concavus. Glover has observed this insect burrowing in the foot stalks of rhubarb or pie plant. (Rep. Com. Agri., p. 90, 1865.) I have also found it on a species of *Rumex*, and also producing a gall in the stalk of the thistle, from which I raised the species. Mr. Webster also bred it from wild sunflowers. (Ent. Am., V., p. 11.)

Lixus macer. Dr. Riley reared this species from *Chenopodium*

hybridum. Coquillett observed it ovipositing in wild sunflower, as also did Mr. Webster. (Ent. Am., V., p. 11.)

Barytychius discoideus breeds in the flower heads of *Helenium tenuifolium.* (Schwarz, l. c.)

B. amœnus was found on ragweed by Dr. Hamilton. (CAN. ENT., 18, p. 114.)

Smicronyx griseus and *S. tychoides* occur on ragweed *(Ambrosia)*, according to Dr. Hamilton (l. c.)

Anchodemus angustus has been found by Mr. Harrington eating the leaves of a species of *Sagittaria.* (CAN. ENT., 16, p. 118.)

Strophosomus coryli has been found by Mr. Bailey on sweet birch *(Betula lenta)*, Jülich (Ent. Am., V., p. 56). In Europe, the species lives on oak, beech, pine and hazel.

Lissorhoptrus simplex lives on the roots of rice. (Riley, Rep. Dept. Agricul., p. 130, 1881–82.)

Magdalis barbita has been found ovipositing in fallen hickory *(Carya amara)*, by Mr. Harrington. (Ent. Am., I., p. 18.)

Magdalis olyra burrows under the bark of oak. *M. armicollis* inhabits the elm.

Magdalis alutacea probably bores in the terminal twigs of *Pinus inops.* (Riley, Bull. Bklyn. Ent. Soc., VI., p. 62.)

Coccotorus scutellaris attacks the fruit of the plum.

Anthonomus quadrigibbus punctures the fruit of the apple and pear. The larva lives in the heart of the fruit, and feeds around the core.

Anthonomus suturalis attacks the cranberry, laying its eggs in the bud, and the larva living inside the fruit.

Anthonomus sycophanta was bred from the galls of a sawfly on willow.

Anthonomus musculus is very destructive to the strawberry.

Anthonomus pusillus lives in the seed pods of the frost weed *(Helianthemum canadense).* Blanchard (Ent. Am., III., p. 87).

Anthonomus gularis oviposits in the flowers of *Cassia marylandica.* (Schwarz, l. c.) *Anthonomus flavicornis* was found by Mr. Schwarz, inquilinous in a globular acarid gall on the leaves of *Solanum eleagnifolia.*

Otidocephalus chevrolatii occurs on elm and hickory, according to Mr. W. H. Harrington. (CAN. ENT., 16, p. 118.) *O. laevicollis* was hatched by Dr C. V. Riley from the galls of a species of Cynips on oak.

Elleschus ephippiatus. I have taken this species in abundance on willow *(Salix fragilis).*

(To be continued.)

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 180, Volume xxii.)

Genus [illegible] Hübner.

1816—Hübn., Verzeicl.

1855—Wlk., C. B. Mus [illegible]., 732.

1862—Morris, Synopsis [illegible]

1873—Stretch, Zyg. & 1 [illegible]renation.

Head rather well developed; [illegible]ding front; tongue moderate, but somewhat variable in the [illegible]nnæ of ♂ long, lengthily bipectinated to the tip, a single [illegible]h side of each joint. Legs short and stout, posterior long[illegible]st; spurs normal, but short; claws of tarsi simple.

Primaries with v 10 out of the subcostal before the end of the cell; 7–9 on a stalk from the same point with 6; 8 and 9 branching just before the tip; 4 and 5 from the same point at the end of the median; 3 from the median some distance before the end of the cell.

Secondaries with 8 from about the middle of subcostal and very short; 6 and 7 from the same point at end of the subcostal; 4 and 5 together from the end of the median; 3 from the median before the end of the cell.

H. caryæ served as the subject on which the above studies were made. It is not improbable that there may be some difference in details of structure in the species. Many of the described forms I have seen but casually, and of a few I have seen large series. This is, in my opinion, the most difficult genus in the *Arctiidæ*. There is a *phytophagic* variation in the larva, and the larvæ are not all of the same type. From the material in the National Museum collection it would seem, too, that larvæ widely different in type, not color merely, produce insects that are superficially almost indistinguishable. The synonymy is involved, and I give it exactly as I have found it.

H. agassizii Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 128, *Halisidota.*

1873—Stretch*, Zyg. & Bomb., 87, 102, pl. IV., ff. 8 and 9, and pl. X., f. 7, *Halisidota.*

1873—Edw., Proc. Cal. Ac. Sci., V., 187, *Halisidota.*
var. *alni* Hy. Edw.
1875—Edw.*, Proc. Cal. Ac. Sci., VII., 129, *Halisidota.*
Habitat—California.

Food plant—Willow, Alder.

H. ambigua Strk.

1878—Strk., Proc. Dav. Ac. Sci., II., 272, pl. IX., f. 7, ♂, *Halisidota.*
bolteri Hy. Edw.
1884—Edw., Papilio, IV., 121, *Seirarctia.*
1888—Edw., Ent. Amer., III., 182, *pr. syn.*
Habitat—Colorado, New Mexico.

H. argentata Pack.

1864—Pack., Proc Ent. Soc., Phil., III., 129, *Halisidota.*
1873—Stretch*, Zyg. & Bomb., 87, pl. 6, f. 12, ♀, *Halisidota.*
1873—Edw., Proc. Cal. Ac. Sci., V., 187, 369, *Halisidota.*
Habitat—California, Vancouver.

Food plants—Pinus pondorosa and P. lambertiana.

H. californica Wlk.

1865—Wlk., C. B. Mus., Lep. Het., XXXI., 311, *Halisidota.*
1873—Stretch, Zyg. & Bomb., 102, =*agassizii.*
angulifera Wlk.
1866—Wlk., Lords Trav. in Vanc. App., 335, *Halisidota.*
1873—Stretch, Zyg. & Bomb., 102, =*agassizii.*
salicis Bdv.
1868—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 81, *Phægoptera.*
1869—Grt. & Rob., Tr. Am. Ent. Soc., III., 175, *pr. syn.*
Habitat—British Columbia, Vancouver, California.

Mr. Grote, in his list of 1882, does not follow Stretch in his reference of this species to *agassizii*, but in a note, p. 63, suggests that *californica*, *agassizii* and *argentata* may be the same species.

H. caryæ Harr.

1841—Harris*, Rept., Ins. Mass., 258, *Lophocampa.*
1855—Fitch*, 1st Rept., Ins. N. Y., 159, *Halisidota.*
1860—Clem., Proc. Ac. Nat. Sci. Phil., XII., 533, *Halisidota.*

1862—Harris*, Inj. Insects, 361, pl. vi., ff. 1 and 2, and f. 175, *Lophocampa.*
1862—Morris in note to Harris l. c., *Halisidota.*
1862—Morris, Synopsis, 349, *Halisidota.*
1863—Saund., syn. Can. Arct., 20, *Halisidota.*
1872—Pack.. 4th Rep[illegible] *Halisidota.*
1873—Stretch*, Zyg. [illegible]40, pl. VI. f. 11, *Halisidota*
1874—Lint.*, Ent. C[illegible] *alisidota.*

porphyria H. Sch.

1855—H. Sch., Lep. [illegible] 283, *Phægoptera.*
1858—H. Sch., l. c. p. [illegible]
1864—Pack., Proc. Ent., [illegible] II., 128, *pr. syn.*

annulifascia Wlk.

1856—Wlk., C. B. Mus., [illegible] L., 743, *Halisidota.*
1860—Clem., Proc. Ac. [illegible] XII., 533, *Halisidota.*
1862—Morris, synopsis, Supplt., 349, *Halisidota.*
1862—Clem., in Morris Syn., 352, *pr. syn.*
1864—Pack., Proc. Ent. Soc., Phil., III., 128, *pr. syn.*
Habitat—Maine, New York, New Jersey, Mass., Arizona, N. Mexico, California, Canada.
Food-plants—Elm, hickory, Ash.

H. cinctipes Grt.

1865—Grt., Proc. Ent. Soc., Phil., V., 242, *Halisidota.*
1866—H. Sch., Corr. Blatt, Regensb., XX., 130, *Halisidota.*
188—Gundlach*, Cont. Ent., Cuba, 269, *Halisidota.*
1884—Hy. Edw., Papilio, IV., 76, *Halisidota.*

tessellaris‡ Wlk.

1856—Wlk., C. B. Mus., Lep. Het., III., 733, *Halisidota.*
1869—Grt. and Rob., Trans. Am. Ent. Soc., II., 72, *pr. syn.*
Habitat—Texas, Florida (?), Mexico, Cuba.
Food-plant—*Hibiscus* (Gundlach).

I have in some way mislaid my original reference to Gundlach's work, and do not find the date in the copy.

H. davisii Hy. Edw.

1873—Edw., Proc. Cal. Ac. Sci., V., 365, *Halisidota.*
Habitat—Arizona.

H. edwardsii Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 129, *Halisidota.*
1873—Stretch., Zyg. and Bomb., 88, pl. III., f. s, *Halisidota.*
1875—Edw.*, Proc. Cal. Ac. Sci., VII., 21—egg and young larva.

translucida Wlk.

1865—Walk, C. B. Mus., Lep. Het., XXXI., 310, *Halisidota.*
1868—Grt. and Rob., Trans. Am. Ent. Sci., II., 85, *pr. syn.*

quercus Bdv.

1868—Bdv., Lep., Cal. (Ann. Soc. Ent., Belg., XII.), 81, *Phægoptera,*
1869—Grt. and Rob., Trans. Am. Ent. Soc., III., 175, *pr. syn.*
Habitat—California.

H. ingens Hy. Edw.

1881—Edw., Papilio, I., 39, *Halisidota.*
Habitat—Arizona.

H. labecula Grt.

1881—Grt., Papilio, I., 174, *Halisidota.*
Habitat—New Mexico.

H. laqueata Hy. Edw.

1886—Edw., Ent. Amer., II., 166, *Halisidota.*
Habitat—Texas.

H. maculata Harr.

1841—Harris*, Rept. Ins., Mass., 259, *Lophocampa.*
1860—Clem., Proc., Ac. Nat. Sci., XII., 534, *Halisidota.*
1862—Morris, Synopsis, 349, *Halisidota.*
1862—Harris*, Injurious Insects, 363, *Lophocampa.*
1871—Saund.*, CAN. ENT., III., 186, *Halisidota.*
1873—Stretch., Zyg. and Bomb., 87, *Halisidota.*

fulvoflava Wlk.

1856—Wlk., C. B. Mus., Lep. Het., III., 733, *Halisidota.*
1858—H. Sch., Lep. Exot., sp. nov., 71, *Phægoptera.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 534, (?) *pr. syn.*
1862—Morris, Synopsis, App., 349, *Halisidota.*
1862—Clem., in Morris Syn., 352, (?) *pr. syn.*
1863—Saund., Syn. Can. Arct., 21, *Halisidota.*

1864—Pack., Proc. Ent. Soc., Phil., III., 128, *pr. syn.*

guttifera H. Sch.

1855—H. Sch., Lep. Exot., sp. nov., f. 284, *Phægoptera.*

1858—H. Sch., l. c., p. 71, *pr. syn.*

Habitat—Nova Scotia, Canada, Maine, Massachusetts, New York, New Jers[illegible]rnia.

Food Plant—Oak.

Halisidota megaphyrrh[illegible]., 308, which should come in here has been referred to [illegible]e and Robinson as not North America.

H. minima Neum.

1883—Neum., Papilio, III [illegible]*sidota.*

Habitat—Arizona.

H. mixta Neum.

1882—Neum., Papilio, II., 133, *Halisidota.*

Habitat—Arizona.

(To be continued.)

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in the rooms, Victoria Hall, London, on Wednesday, August 27th. The following officers were elected for the ensuing year :—President, Rev. C. J. S. Bethune, D.C.L., of Port Hope ; Vice-President, Mr. James Fletcher, of Ottawa ; Secretary. Mr. W. E. Saunders, of London ; Treasurer, Mr. J. M. Denton, of London. Directors—Messrs. W. H. Harrington, Ottawa ; J. D. Evans, Sudbury ; Gamble Geddes, Toronto ; A. W. Hanham, Hamilton ; J. A. Moffat, London. Curator and Librarian, Mr. J. A. Moffat, London. Editor of the CANADIAN ENTOMOLOGIST, Rev. C. J. S. Bethune, Port Hope. Editing Committee, Mr. W. E. Saunders, London ; Rev. T. W. Fyles, Quebec ; H. H. Lyman, Montreal. Delegate to the Royal Society of Canada, Rev. T. W. Fyles, Quebec. Auditors, Messrs. J. H. Bowman and H. P. Bock, London. The President's address and a full account of the proceedings will be published in the Annual Report of the Society.

THE BUTTERFLIES OF INDIA.*

Some three years or more ago, we noticed a work on the above subject by Marshall and de Nicéville, of which two volumes had been published, the last by de Nicéville alone. A third volume of over 500 compact pages has just come to hand, the most notable thing about which, at least to a dweller in temperate regions, is that it is wholly concerned with the Lycaenidæ, of which eighty-two genera and over four hundred species are described. Such wealth in these pigmies among butterflies is a striking fact. The author, however, beyond the generic collocation, has made no attempt to classify this immense assemblage, contenting himself with only distinguishing certain groups of genera by the name of one of the included genera, as the "Thecla group," etc., which groups are characterised in a general but not formal way in the body of the work. These agree tolerably well with the groups Doherty had previously characterised from the egg alone, but are about twice as numerous and are established mainly upon the structural features of the imago. This is better than Distant's artificial divisions, but there is plainly an open field here for investigation, and one which there is apparently no need for great delay in occupying, since (excepting the egg) the early stages of Lycaeninæ appear to offer less service to the systematist than in any other group of butterflies.

What will surprise one in this volume, is the very considerable addition to our knowlege of the early stages of the Lycaeninæ, for excepting the Hesperidæ, this group is in general the least know of butterflies. Yet something is recorded of no less than thirty-four genera, much of it new, and in many a good deal of interesting history is related. This is a great improvement on the preceding volumes. One particular case, that of the pomegranate butterfly, whose history was briefly and partially given by Westwood, seems valuable enough to reprint for the benefit of American readers; and another, Curetis thetis, may well be mentioned here:—"The twelfth segment [of the larva] bears two most extraordinary structures, which consist of two diverging, cylindrical, rigid pillars, arising from the subdorsal region and of a pale green colour. When the insect is touched or alarmed, from each pillar is everted a deep maroon tentacle as long as the rigid pillar, bearing at its end long

*The Butterflies of India, Burmah and Ceylon. By Lionel de Nicéville, Calcutta. Vol. 3. 12+503 pp. 6 pl. 1890. 8°.

parti-coloured hairs, the basal third of each hair being black, the upper two-thirds white. The maroon tentacle with its long hairs spread out like a circular fan or rosette is whirled round with great rapidity in a plane parallel to the body, its use being almost certainly to frighten away its enemies, as this larva, as far as I am aware, is not attended by protecting ants and lacks the [illegible] the eleventh segment present in so many lycænid larvæ [illegible] by ants."

Ants have been found [illegible] half a dozen genera, and in many cases they have bee[illegible] Dr. A. Forel, of Switzerland. At least a dozen species [illegible] and they are about equally divided between the Formici[illegible]cidæ.

Spalgis, it appears, is anot[illegible] of a carnivorous lycænid comparable to our Feniseca, the [illegible]ng with and feeding upon the "mealy bug" of the planters, [illegible]Dactylopius. De Nicéville in no way favors Edwards's belie[illegible]ca belongs to the Lemoniinæ, and adds nothing, as we had hoped he might be able to do, to Holland's suggestion that Liphyra, too, might be carnivorous, though he points out that the two genera differ in their perfect state in the number of subcostal nervules, and are therefore not so closely allied as Dr. Holland thought.

The seasonal dimorphism of many Indian Lycænidæ is well brought out, the dry and wet season taking the place of our spring and summer; indeed, it occurs in no less than eighteen genera, and this will be a revelation to many, and seems to bid fair to renovate the study of tropical butterflies. But while in India proper, "the seasonal forms seem to be chiefly restricted to two, a wet and a dry," in the Himalayan district of Sikkim "the dry season form which occurs at the end of the year differs somewhat from the dry season form which occurs in the spring, so that with regard to some species there may be said to be three forms—a spring, a wet season, and a winter form." Sexual dimorphism on the contrary is very rare among tropical Lycænidæ, de Nicéville stating that he does not know positively of any case, though he suspects it in a species of Zephyrus. On the authority of Doherty (a native of Cincinnati by the way, working most industriously in the east,) he credits half a dozen or more species as mimicking others of the same or neighboring groups of Lycænidæ. Much attention is also paid to the secondary sexual characteristics so far as their gross appearances are concerned, and they are noted in no less than nineteen genera.

Finally, we may call attention to the very interesting general chapter on the Lycænidæ at the beginning of the volume, which is of more than usual interest and rather exceptional in a work of this kind. The work itself must serve a very useful purpose; its execution is remarkably even and shows great skill and balance on the part of the author. There are half a dozen plates like those of the former volumes and executed by the same parties, excepting that two of them are chromo-lithographs, but we could wish that some plates of the early stages might have been added, and the direct purposes of the book for the Indian student would have been served by others giving structural details.

SAMUEL H. SCUDDER.

PARTIAL PREPARATORY STAGES OF ERYCIDES BATABANO, LEF.

BY HARRISON G. DYAR, RHINEBECK, N. Y.

EGG.—Nearly spherical, the base flattened a little. Around the sides are eighteen vertical ribs, every other one shorter, not reaching the summit. The natural color could not be ascertained.

* * * * * * *

THIRD (?) LARVAL STAGE.—Head much larger than joint 2, flat before, broadly excavate at the summit, minutely granulated. Colot wine red, blackish on the lower third, with a large round orange spor before the eyes on each side. Width of head 2.5 mm. The body tapers to each extremity. Its color is wine red, with a darker shade over the dorsum centrally, and seven transverse orange stripes on the upper half of the body on joints 5 to 11, anteriorly, the posterior ones interrupted dorsally. Venter a little whitish. Length of larva about 10 mm. It forms a place of concealment in the manner of *Endamus tityrus* or *E. proteus* by folding over a portion of the leaf and securing it by threads.

FOURTH LARVAL STAGE.—Head much as before but the black shade is less and the granulations more distinct. Width 3.8 mm. Body marked as before; very minutely pilose and with small semi-obsolete circular

spots. Spiracles small and whitish. The cervical shield covers the upper half of joint 2, is smooth and wine red. Length of larva 20 mm. When disturbed, it ejects from its mouth a large quantity of dark red fluid.

FIFTH LARVAL STAGE.—Mature larva. Head pale brown, blackish around the mouth with a l[illegible] spot before the eyes. It is granulated and pilose, the [illegible] ppearing frosted on the upper part of the head. Width [illegible] dy is much contracted, and much smaller at the extren[illegible] shield pale brown, smooth, hidden when the insect is at [illegible] is pinkish below. The body is bright frosted white, thickly [illegible] little circular depressions, in the centre of each of which is a [illegible] rosted hair. These hairs are longer on the anal plate, ar[illegible] n there less deep. Thoracic feet pale brown. Venter and [illegible] t white, without the marks of the dorsum. Length of larva [illegible] ıtest width of body 12 mm., greatest height 10 mm., width of joint 2 4.5 mm. Its place of concealment, at this stage, is formed of several leaves spun together and lined with silk. Immediately after the moult, the body is colored as in the previous stage, but the white color appears gradually in the course of several days.

The leaves the larva has spun together serve as its cocoon, and the pupa is held by several transverse threads around the body, with the cremaster fastened in others.

PUPA.—Robust; abdomen large, eyes prominent. Two short prominences on the head between the eyes. The leg and antennæ cases form a point extending below the wing cases. Cremaster excavate below, with ridges at the sides above, curved downward, blunt, and terminating in a number of brown hooks. The pupa has many small, rounded depressions, and is minutely pilose. Color creamy white, a greenish tint on the thorax and cases, and a yellow stripe on the upper part of the eye. Length 32 mm., diameter of the abdomen 10 mm., diameter of thorax 9 mm., width through the eyes 6 mm.

FOOD PLANT.—Mangrove, *Rhizophora mangle;* larvæ from Dade Co., Florida. I am not sure that the larval stage here first described is the *third*, but consider it most probable.

Mailed October 6th.

The Canadian Entomologist.

VOL. XXII. LONDON, NOVEMBER, 1890. No. 11.

PROCEEDINGS OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Continued from page 199.)

The Club met again at 5 o'clock, August 20th. Mr. J. Fletcher presented some notes upon injuries caused by the Hessian Fly, the Wheat-stem Maggot and an undetermined species of Oscinis. He said that the note was presented with the object of eliciting further information upon a subject which had proved of great interest to him. During the past season he had endeavored to determine the number of broods of the Hessian Fly for the Ottawa district, and had found, first, that the Hessian Fly, the Wheat-stem Maggot and Oscinis were all found at the same time and in the same plant, and further, that, speaking generally, they passed through their stages contemporaneously. Of the three the last had proved much the most destructive. From root shoots of wheat sown on the 14th of April he had bred Hessian Fly and Oscinis at the end of June, and a month later Meromyza had appeared. He had also noticed in some fields at Ottawa that a large quantity of spring wheat was attacked by Hessian Fly in the ground shoots, or stools, in the same manner as fall wheat is attacked in the autumn. It was frequently the case that on plants which had made from fifteen to twenty stools but one would be left, all the others having been destroyed by the insects. He had procured adult Hessian Flies at Ottawa during this season in the beginning of May, at the end of June, and in August, and they would probably appear again in September. He had not been able to find the Hessian Fly breeding in any of the grasses, and would like to know if others had done so. Meromyza and the Oscinis had been most troublesome pests in the experimental grass patches at Ottawa, some grasses being almost exterminated by them. It was remarkable that the spring appearance of Meromyza had been so enormous as to have caused fear of a serious destruction of the wheat

crop. As a matter of fact, however, there had been less injury, both to small grains and grasses, than for many years previously. This diminution he could only explain by the supposition that the eggs had been destroyed by some predaceous insect. The eggs must have been laid in large numbers, but there was very little evidence of the presence of the larvæ, either in the standing wheat or barley, or in the root-shoots of barley. The Oscinis he had been unab[illegible]it, through the kindness of Mr. John Marten, of Illinois, h[illegible]ome work which had been done by Prof. Garman in Kentuc[illegible] was probably the same species. This, Mr. Marten said, had [illegible]y identified by Dr. Williston as *O. variabilis.*

Prof. Garman stated that he had s[illegible]lied what appeared to be the same species, and had prepared an arti[illegible] for publication. He also gave some notes upon the life history and an[illegible]my of the insect.

Prof. Osborn had taken at Ames, I[illegible] numerous specimens of Oscinis, one of which closely resembled that e[illegible]ted by Mr. Fletcher.

Prof. Alwood had studied in Ohio an Oscinis infesting oats, and had published his results in Bulletin 13, Division of Entomology. He had found the eggs, from two to eleven in number, were forced beneath the sheath of the leaf, and that just prior to pupation the larva gnawed through the epidermis and the pupa protruded so as to admit of the easy escape of the adult.

Mr. Fletcher, referring again to Meromyza, stated that in many instances he had found the egg deposited in the field upon the upper surface of the leaf some distance from the stem, and asked if others had observed this to be the case elsewhere.

Prof. Garman had found that the eggs were laid just above the sheath, or sometimes pushed beneath it.

Prof. Webster stated that the eggs of the Hessian Fly had, in the spring of the present year, throughout Southern and Central Indiana, been deposited near the roots, the "flax-seeds" being found in that portion of the plant; while in the northern part of the State the case had evidently been different, as the "flax-seeds" were there almost invariably located about the second joint.

The Secretary read a paper by Mr. Edward L. Graef, of New York, upon the American Silk Worm Moths or Spinners, in which a serious

attack upon the shade trees of New York by *P. cecropia* was recorded, and the suggestion made that this and other species might be turned to account, if any means could be devised for manufacturing and utilizing their silk. As a stimulus to this industry, Mr. Graef generously offered a prize of fifty dollars for the best essay and model of apparatus for carrying this suggestion into effect.

Thursday, August 21st.—The Club met at 8 a. m. Dr. C. M. Weed read an interesting paper upon the clover-stem borer, *Languria mozardi.* Fifteen species of plants were reported upon which the larva had been found feeding. This paper was discussed by Profs. Cook, Alwood, Osborn and others.

Prof. Alwood spoke of tobacco insects, of which he was making a special study. He had observed a stem borer which was very injurious.

Dr. Weed had learned of a tobacco root-louse in Southern Ohio.

Prof. Garman spoke of the mouth parts of several species of some families of Thysanoptera, and stated that some recent studies had shown him that the figures published did not agree with his material. He then read the following paper:—

AN ASYMMETRY OF THE HEAD AND MOUTH PARTS OF THYSANOPTERA.

In a brief paper in the Bulletin of the Essex Institute I have recently called attention to peculiarities in the structure of the head and mouth parts which set this group quite apart from other orders of Hexapoda. [This has no reference to affinities upon which, I believe, we are not prepared to pronounce until this and several other groups have been more completely studied.] In that paper it was claimed that the endocranium of the species examined was not symmetrical, being deficient on the right side; that the labrum was one-sided; that there was a developed mandible on the left side, with, at most, a rudiment on the right; and that the mandibles of authors were probably lobes of the maxillæ.

At the time the paper was written I had not examined sufficient material to enable me to say whether the features pointed out were limited to certain species or were common to all members of the group. Since then many additional forms have been examined, all, however, belonging to the families Stenopteridæ and Coleoptratidæ, and in no case has there been found a departure in essentials from the structure of the head and

mouth parts as they were described in the paper referred to. It is probably safe to assume, threfore, that the asymmetry noted is characteristic of these two families at least.

Of the group Tubulifera no representatives have been studied. I shall not be surprised, since this is the lowest of the suborders, if examples of Phlæothrips are found to be more nearly symmetrical.

As an interesting fact, t related to the main purpose of this communication, I hat the solitary mandible of Limothrips and Melanoth te, like the jaws of larval Chrysopa, of Dytiscidæ, and In specimens of Coleoptratidæ examined, both labial and ma palpi are composed of three segments.

Note.—Since my return from the meeting of the American Association I have se ple of very young Phlæothrips. My examination of these is d, but I have succeeded in demonstrating the single jaw on the left side. The parts are greatly elongated, and remind one of the same organs in Hemiptera. The styliform parts are especially long, extending, when retracted, into the cranial cavity towards the eye, thence bending posteriorly and extending along the posterior wall of the head to the mouth-opening. Both mandible and styliform parts are perforate (or possibly grooved).

Two unmistakable tarsal claws are present in this genus. From their relation of position to the pads the latter would seem to be modified pulvilli.

Prof. Osborn was much pleased with what Prof. Garman had stated. He had also observed some of the points mentioned in a special study which he had made of these insects, and hoped Prof. Garman would publish his results as soon as possible.

Dr. Weed presented a short paper on the oviposition of *Listronotus latiusculus*. The eggs are laid in clusters of from five to ten upon the leaf stalks of *Sagittaria variabilis*, and are covered with small pieces of the epidermis which are nibbled off by the adult beetle. This was discussed by Messrs. Garman, Fletcher and Webster.

Mr. Charles Robertson, of Carlinville, Ill., read a most interesting note upon the habits of the bee *Emphor bombiliformis*, which was originally described by Cresson as a *Melissodes*, but Paton, in revising the

genus, raised it to *Emphor*. This bee, it was stated, confines itself almost exclusively to *Hibiscus*, chiefly *H. lasiocarpus*. The appearance and habits of the bee were described. It was stated that in collecting these bees it is important to catch those flying around the plant without alighting, as these were generally the males, whilst those visiting the flowers for honey and pollen were the females. On August 5th, when walking along a dam with water on one side, he had noticed a female standing upon the water; she then flew to a bank, and he observed that she was carrying water to facilitate the excavation of hard ground, into which she was burrowing to build her nest. Sometimes one pellet of earth would be taken out after such an application of water, but at others three or even four. An interesting discussion followed which was participated in by Messrs. Osborn, Cook, Weed, Fletcher and others.

Prof. Osborn read the following note "On a Peculiar Form of Coleopterous larva":—Eleven years ago, while a student in college, I found a peculiar form of larva boring in the twigs of ash trees, and it was described at the time in the students' journal at the college (The Aurora, May, 1879, page 5,) under the caption "A Grub With Legs on its Back." The description is as follows: "The specimen was found boring in the pith of a small twig on an ash tree near the road west of the college, apparently beginning at or near the tip of the twig and working downward. Numerous twigs were found that had been inhabited in this way, but only one specimen of the borer was found—this about a quarter of an inch long, quite slim, and nearly white. Its great peculiarity consists in the disposition of its locomotive apparatus. The first three segments following the head are provided with the usual pair of legs, each in the normal position—that is, on the ventral surface. The following six segments are provided each with a pair of pro-legs, similar to those found on many caterpillars, but, strange to say, these are arranged upon the *dorsal surface*, exactly the opposite of the usual arrangement, while the number six is different from either the caterpillars, where there are four or five, or the saw-fly *larvæ*, which have eight. The remaining three segments have no propellers whatever. The beauty of this arrangement, for the conditions of the borer, can at once be seen, for it has as much foot-hold above as below. Placed upon a flat surface it could make no advancement, but wriggled awkwardly about, evidently seeking its double foot-hold. Placed between two thin plates of glass, it moved rapidly, using all its legs, and

going with equal facility backward or forward, either side up. If provided with some support at one side it was possible for it to travel by means of the legs on its dorsal surface alone."

During the present season an example of a similar larva has come to my notice, specimens being first observed by Prof. L. H. Pammel, occurring in the stems of *Heli*[illegible]. Their possessing similar locomotive organs upon the back calle[illegible]culiar larva noticed years ago. They differ, however, somew[illegible]s well as in the plant on which they occur, and I find that they att[illegible]raciously dipterous larva that were living in the same stems. W[illegible]ther they are normally carnivorous remains of course to be determined, but there can be no question of their attacks upon these larvæ, and apparently w[illegible]th the intent of obtaining food from them. These specimens are of a[illegible]bluish colour, possessing prolegs upon segments 4-9, inclusive, and a[illegible]ir of tubercles on the ventral portion of the anal segment, as well as a[illegible]orsal tubercle on the terminal portion of the same segment. In general appearance there is a striking resemblance to the *Languria* larva, as shown in figure exhibited by Dr. Weed, but in his drawing there is no indication of the dorsal feet.

The Club convened at 5 p.m., and considered the following resolution :—

Resolved, "That it is the sense of the Club that the meetings of the Association of Economic Entomologists and of the Entomological Club would both be benefited by holding such meetings, if possible, at the same time and place as the meeting of the American Association for the Advancement of Science."

After discussion by Messrs. Fletcher, Osborn, Cook, Alwood, Weed and others, the resolution was unanimously adopted.

The Secretary read a paper by Prof. D. S. Kellicott, of Columbus, O., upon the "Preparatory Stages of *Eustrotia caduca*." He had collected the larva upon *Nuphar advena* at Rives Junction, Michigan, in 1876. From these he had bred a moth, afterwards named by Mr. Grote *E. caduca* in the CANADIAN ENTOMOLOGIST, Vol. 8, p. 207. During July of the present year he had again collected the insect at Corunna, Michigan, and had succeeded in breeding and describing all the stages, which were submitted herewith.

The larvæ found in 1876 were feeding in the fruit, but those studied

during this summer were found upon the leaves. If these latter were floating, the larvæ were exposed on the upper surface, in other cases they were beneath or concealed in folds. A different habit of swimming to that of *Arzama obliquata*, which progresses by horizontal undulations was noted. *E. caduca* swims strongly, but by an entirely different motion. The posterior third of the body is bent downwards like the tail of a crayfish and then quickly pushed backwards, thus driving the insect ahead by jerks.

Discussed by Messrs. Weed, Webster and others.

Prof. Cook reported having bred *Agrotis C-nigrum* through all its stages upon black currant, the eggs having been laid in a cluster upon leaves of that plant on 1st of June—the perfect insect appearing on the 1st of August.

Prof. H. Osborn read a note on the "Period of Development in *Mallophaga*." The habits of the species of *Mallophaga* render accurate observations upon the time required in development of the eggs a matter of considerable difficulty. While in some of the species upon very common birds it is possible to get an abundance of material, in other cases the opportunities for obtaining such material are very rare. But in the most common species the difficulty of determining the exact time of deposition of eggs, and then of keeping individuals in such conditions as to insure a normal development, makes positive observations difficult. This being the case, any observations which may add to our knowledge of the subject seem of interest, and the present note is offered as one such contribution.

The species chosen in the present case is the *Nitzschia pulicare*, which is almost invariably to be found in abundance on the common chimney swift (*Chætura pelasgia*). This bird is an abundant resident of the building in which my laboratory is located, and being readily obtained on account of its tendency to fly in at the windows, I suggested to Mr. P. H. Rolfs, a graduate student in biology, that he attempt the rearing of larvæ from eggs with a view to determine length of developmental period in connection with studies of its embryology.

For this first purpose he secured on two separate occasions a number of the eggs, and kept them, part in a tight paste-board box, which was kept warm by the heat of his body, the others were enclosed in

cotton-plugged tubes under a hen that was kept in the laboratory at the time for incubating eggs for embryological work. Of the first lot, all kept in pocket, secured July 27th, two eggs hatched Aug. 4th, five between Aug. 8–13th, one Aug. 16th, the last giving twenty days, the longest period.

Of the second lot secured, Aug. 3rd, six hatched between the 8th and 13th, four hatched Aug. 14th (three in box and one in tube), two Aug. 15th (one in box and one not hatching, and the longest period in this case being thi

Assuming that those req est time had been deposited but a short time before the egan, we should have from fifteen to twenty days as the c equired for the eggs to hatch for this species.

Mr. F. S. Earle presented ting notes upon the injurious insects of the season in Sou pi. *Diabrotica 12-punctata* was a very abundant insect, at to its well known food plants it had been a serious pest to peach trees and cabbages. Leaves of the latter, bitten by the insect, at once decayed from the point of injury. Cut-worms were very destructive in gardens, and cucumber and melon vines were much injured by a plant-louse. Potatoes had been much attacked by a black flea-beetle, and the tomatoes by the boll-worm in the fruit, and on the leaves by the sphinx larvæ.

Prof. Cook would like to hear the experience of those present as to a practical remedy for the attack of the boll-worm upon the fruit of tomatoes.

Prof. Osborn said that Mr. Tracy had tried arsenical mixtures with some success, and also had attracted the perfect insects to light.

Miss M. E. Murtfeldt read the following paper:—

SOME EXPERIENCES IN REARING INSECTS.

In rearing insects, as with many other enterprises in life, we climb the ladder to success by the rounds of successive failures, having in many cases to exhaust an almost infinite range of "how *not* to do it," before arriving at its happy converse.

Many and great are the disappointments of the entomologist; but does he succumb? Never! What single point in the biology of a species has been relegated to the absolutely undiscoverable? I do not

know of one, no matter how obscure the subject or how little advance has yet been made in the direction of its elucidation.

"Hope springs eternal" in the breast of the entomologist, and patience and perseverance have in him their "perfect work," until Nature relents, or is caught "off guard," and the secret, so carefully hidden, is revealed.

I am tempted to enumerate some of the discouraging circumstances encountered by the biologist in this field.

Among the *Lepidoptera*, a majority of the *Bombycidæ*, *Geometridæ* and *Noctuidæ* adapt themselves readily to the conditions of the rearing cage. They accept the food provided and make the best of it, even after it has become a little dry, which must sometimes occur when the caretaker is pressed for time. They thrive in the closer and darker air, and take such exercise as they require within their narrow walls of glass and wire-cloth, and when the metamorphic impulse comes they contentedly weave their cocoons in the corners of their prison, or bury themselves in the two or three inches of cemetarial earth in the bottom of the cage, and safely pass those mysterious transformations which give to this class of beings their pre-eminent interest.

But there is a great deal of individuality, or rather, specificality, in insects, and not infrequently specimens of larvæ are found for which the collector taxes his ingenuity in vain to provide. Not the freshest of leaves, the cleanest swept earth or the most well-aired of cages will seem to promote their development. They wander about the cage with an exhausting activity that pathetically suggests a realization of their imprisoned condition. They nibble languidly at their food, and aimlessly spin mats of web in inconvenient places, over the cracks of the door or cover, for instance, and, before long, comes the morning when they are discovered dead and discolored in the bottom of the cage, *and no more of them to be obtained until another season.* Or perhaps the cocoons are spun or the transformation to pupæ safely effected under ground, and the entomologist has full confidence that in due time he will obtain the much desired imago, and, when it may be expected, watches hourly for its emergence, and is rewarded by the appearance of an *Ophion* or a swarm of *Tachina* flies, or of some still smaller enemy, whose existence he did not even suspect.

Again, the collector may be obliged to delegate his cares temporarily

to another, who, unused to the almost constant supervision necessary, suffers the precious larva to starve, or, by an oversight, tosses it out with the withered leaves, or crushes it in the hinges of the door, or, still more aggravating, thoughtlessly raises the cover and allows some long looked for imagine to dart out and escape through an open window. All that he will remember for the benefit of the person chiefly concerned, will be that it was a moth and "seeme culiar." As the entomologist cannot afford a separate cag cies, and as he had probably put his choice unknown in ll known forms of which he wishes simply to increase his probably grasps at the hope that the escaped insect was on , and so defers the full realization of his loss until weeks and mon ve passed and all his expected species have emerged, and then he h r better success another year, and finds "life well worth living" fo nd similar reasons, which only an ardent naturalist can appreciate.

In some respects too much care is as subversive of success as too little. For instance, the very natural curiosity which the student feels to examine into the state of the insect after it has been buried for a short time in the earth. So he sifts the soil in his cage, and though he handles it with all caution, the frail earthen cell in which his treasure is enclosed falls in pieces, and the poor caterpillar in complete helplessness squirms in the loosened earth. Despairingly he tries with clumsy fingers to reinclose it in the fragments of its cell, or attempts to form a substitute by packing the earth so that it may not be smothered. In vain. In ninety-nine cases in a hundred he never sees the imago.

While the hardy pupæ of most noctuids will bear any amount of handling, and by their activity will beat hard the earth about them at any time, a few species absolutely resent the least disturbance. I think that for seven or eight successive years Dr. Riley and I tried in vain to obtain the imago from a beautiful larva found every autumn in greater or less numbers on *Gnaphalium*, and occasionally on the Asters and some other *Compositæ*. Not being able to associate it with its species we designated it the "pretty cut-worm." It was Dr. Riley's practice to have the earth in his cages sifted occasionally during late autumn and winter to see how the pupæ were fareing, and to have each species collected into its particular corner or side of the cage, which was designated by the label on the door.

But in the case of this particular species this orderliness was fatal. After Dr. Riley went to Washington, I resolved on the "let alone" policy. I put the larvæ into a cage with clean earth with an admixture of sand which I dampened slightly and only at considerable intervals during winter, kept the cage in a very cool place, and the next summer was rewarded with several fine specimens of *Mamestra legitima*, my only disappointment being that it was a species by no means uncommon.

With me *Scopelosoma sidus* behaved in an almost equally capricious manner, but was, after many trials, finally reared by adopting the same methods as with *legitima*. I now make it a practice to sift or change the earth in my cages only in the spring and autumn before the hibernating pupæ are formed. Of course, if I wish to note pupal characteristics, I have to run the risk of the disturbance, but this is only occasional. I have found that frequent dampening, when the cages are kept in doors, is also detrimental, and that hibernating larvæ and pupæ are far less likely to suffer from drought than from dampness.

In rearing the Micro-lepidoptera—in which I have an especial interest—various tactics must be pursued, and the imagination is often vainly taxed to suggest a provision which the delayed changes and general unrest of the insect plainly call for.

Under natural conditions it is very difficult to keep track of these small creatures. The leaves or flowers or fruits on which they may be found feeding on one day will be deserted by the next, and during the darkness they will have betaken themselves to parts unknown, the most assiduous search failing to discover them. In the rearing jar some species adapt themselves very kindly; others will crawl about for days spinning threads of silk over sides and cover and finally dry up without effecting their transformations.

An accident to which the student is liable, and against which he can with difficulty make provision, is to have the larva, which he has perhaps just described and figured, escape. How often have I taken up a bottle in which I had been rearing a particularly precious unknown, and found a tiny hole in the muslin cover, or perhaps a little flap cut at the edge of the bottle, telling only too surely of the loss and delay which a further examination verified. The annual brooded species which appear in the spring are the *beteis noir* of the Micro-lepidopterist, especially such

species as pupate on or just beneath the surface of the ground. They have to be cared for during the long, hot summer, as well as the autumn and winter, and to keep the safe middle course between the Scylla and Chaybdis of drought and of the dampness which would promote the equally fatal mould, requires the most careful attention. The annual brooded species which later [illegible] leaves, or feed in the fruit capsules of various plants, [illegible]ms, are comparatively easily reared, with a few exceptions. [illegible]umber of years before I succeeded in obtaining the moth [illegible]esting larva which fed in the capsules of *Pentstemon*. This was [illegible] the peculiar change of habit during hibernation. After eating all the [illegible]ds from both divisions of the capsule, it would thoroughly line one all [illegible]h silk, after cutting an aperature for escape, and ensconce itself, as [illegible]t reasonably be supposed, for its winter's sleep. But no; the neatly [illegible]d cell was only a temporary abode, which, during the inclemency of mid-winter, was to be deserted for an entirely different one. Where, in the state of nature, I have not yet been able to discover. In my rearing jars it perished, year after year, to my inexpressible disappointment, until finally I wintered a number out of doors in a small wire cloth box closed with a cork. From this collection I at last obtained the moth—a beautiful *Conchylis*—from a larva that had bored into and transformed within the cork. But for two or three years I had only the single specimen, and next to the aggravation of utter failure I rank the possessor of an unknown unique. It may be new, and if sent to a specialist he will generally feel somewhat aggrieved if you reserve the right of description and further impose upon him the duty of returning the specimen. Then there is the danger of its destruction, either in the mail or express, to be braved, and yet, so long as one does not know the species, or be assured that it is new, one never can take full satisfaction in having bred it.

Last year I had the satisfaction of obtaining nearly a dozen imagines of the *Conchylis* in question by providing a number of bits of pith and cork in which the larvæ bored after their desertion of the capsules where they had fed.

Wherever I can make satisfactory arrangements for keeping track of them, I winter my Micro-larvæ and pupæ out of doors. Such species as bore the pith of stems are very easily cared for, and leaf miners and webbers I enclose on the surface of the ground, in some sheltered situa-

tion, under wire sieves or covers, bringing them in in the spring in order to have the little moths emerge where they can more easily be chloroformed or transferred to the cyanide bottle.

I must confess that I have never had signal success in rearing such species of the *Tenthredinidæ* as transform under ground. I have in mind more than a half dozen species—the larvæ of which are most interesting—of which I have so far failed to obtain the imagines, in spite of my utmost care.

The leaf and root-feeding beetles have always developed satisfactorily for me, but the *Cerambycidæ*, which feed on growing wood, have given me much trouble, and, in many cases, failed me utterly.

Orthoptera require but little care, as also do leaf-feeding *Hemiptera*, but the Cannibal species of both these orders are more difficult to cater to, and often refuse a diet that one would think would be irresistible. This is especially true of the carnivorous bugs which I have found require large space and ample provision to preserve them from fraternal rapacity.

With the aquatic orders I have had but little opportunity for experiment, but think they must furnish many very interesting subjects.

I believe that costly insectaries are being constructed by many entomologists, and no doubt will afford room for much thorough study of forms and habits. But such costly appliances are not absolutely necessary, and sometimes make observations more difficult than when the conveniences are more primitive.

A secure enclosure, fresh food, fresh air and clean water in the bottles are almost the only requisites in rearing the herbivorous species, and the more constantly the cage or jar is under observation the more thoroughly of course are the history and habits of the species revealed to us. When I wish to know all about a species, I keep the cage or jar on one corner of my desk and watch its occupant in the intervals of other work.

I cannot hope that I have conveyed much information in these notes to those who have gone over the same ground, but I am at least sure that I have recounted some of the experiences of every biological student of insect life, and can sympathise in his disappointments and appreciate the satisfaction of his successes.

Friday, August 22nd.—The Club met at 8.30 a. m. Dr. Weed presented a short paper on the habits of *Lixus concavus*.

As reported in the bulletin of the Ohio Ex. Station, Mr. Alwood had found this insect injuring the stems of rhubarb. During the past summer he had bred it from all parts of the stem of the common curled dock.

Prof. Alwood stated that [illegible] the larvæ of *Gortyna nitela* eating those of *Lixus*.

Dr. Weed read a paper upon u[illegible] *Psephenus Lecontei*.

Prof. Webster and Mr. Fletch[illegible] ce on the habits of this beetle.

Prof. Hargitt read a note upon a large foliaceous gall which destroyed the tips of the stems of various species of *Solidago* at Bloomington, Indiana. In many instances as many as nin[illegible]ty-nine per cent. of the flower stems had been destroyed.

Prof. Hargitt read a note upon the Canker Worm. He said: "My attention was drawn to an orchard near Oxford, Ohio, which, for three or four years, had been seriously affected by this pest. In May, 1890, I went to examine the orchard and found it thoroughly over-run by the larvæ, many of the trees being actually dead, and several others in a very weak condition. The orchard, viewed at a distance, had the appearance of having been burned, the leaves being brown and dead. The trees were most attacked upon the outer rows, particularly those adjoining a wood. I recommended spraying with one of the arsenites, but it was too late for the present season. I observed several small birds in the orchard actively engaged in feeding upon the larvæ, amongst them the cedar bird, blue bird, summer warbler, chipping sparrow and field sparrow."

Prof. Hargitt also read a note upon *Cermatia forceps*. He had found that this Myriapod had become abundant in houses and the college building at Oxford, Ohio, during the past two or three years. He had experienced the same difficulty in keeping the insects alive in captivity, as was mentioned by Dr. Lintner in his 4th Report. He had succeeded in keeping them for several days and inducing them to take prey by keeping them in dark quarters in a tin canister during the day. When so confined they had fed freely upon house-flies, and other insects supplied them.

Prof. Webster spoke of the predaceous habits of *C. forceps*, and its special fondness for the Croton-bug *(Ectobia germanica)*.

Mr. Fletcher had observed the insect when visiting Mr. Howard at Washington, D. C., who had described to him its remarkable habit of capturing the Croton-bug by springing over it and thus encaging it beneath its many curved legs. He was of the opinion that those who had failed to keep this insect in captivity had done so from omitting to supply a sufficiency of moisture, and thought that Mr. Hargitt's success in the instance mentioned, where the insect was put in a tin can, was more due to this cause than to the darkness. *Myriapods* are generally found in damp, dark places.

The Club proceeded to elect officers for the ensuing year. Prof. Cook, the retiring President, congratulated the members upon the harmony which had existed throughout the sessions, and was glad to find that, although some old and pessimistic members of the Club had predicted that it had run its course and would soon flicker out like a spent candle, he was glad to find that the present meetings had not only been the best attended for many years, but that the discussions and papers had been equally interesting to those of any meeting which he had had the pleasure of taking part in. He wished the Club every success and trusted that it would grow stronger and stronger every year. The following officers were elected :—

President, Prof. Herbert Osborn, Ames, Iowa.

Vice-President, Miss Mary E. Murtfeldt, St. Louis, Mo.

Secretary, Dr. C. M. Weed, Columbus, Ohio.

Prof. Osborn, at the invitation of the President, introduced the subject of the use of contagious diseases in combating injurious insects. He said that he had already published a paper in the Transactions of the Eastern Iowa Horticultural Society for 1886, pp. 400–405, upon this subject; but that it was of such importance that he desired to hear it discussed by the members of the Club. He first mentioned the well-known fungous and bacterial diseases which attack insects, as Muscadine, Grassen or Jaundice, Pebrine, Flacherie or Flaccidity, Foul-brood of Bees, Fly and Grasshopper Fungus, and the White-grub Fungus, and called attention to the fact that we were already able to control those which affect important domestic species, as Silkworms and Bees, and that to some extent at least we are able to control those available as agents in destroying

injurious species. After considering the various conditions limiting the applicability of this means, he drew the following conclusions:—

(1) That there are diseases amply sufficient as a basis for economic work, the bacterial forms giving the most promise for all cases where early results are desired, while those due to fungi, so far as present knowledge goes, propagating slowly, can only be used as slow but efficient checks to injurious [illegible] that we can do with them being to introduce them in [illegible] they are not already found.

(2) That the diseases can be [illegible] to the extent of preserving the germs for a season and transp[illegible] from place to place to use for inoculation, but that their spread in n[illegible] will be affected by conditions beyond control, while only such insects as occur gregariously, or live in mingled hosts, can be attacked to advantage.

(3) That the cost of application would prevent its adoption except in certain forms.

(4) That we must consider this method of contending with insects at best as but one of a number of profitable methods to be used in certain cases where other methods are insufficient, and to supplement other methods when it can be done to advantage. With this end in view, the diseases of insects are worthy of the most careful study, and will not, he thought, disappoint the investigator in their final results.

Mr. Fletcher thought that the chief difficulty with regard to these fungous diseases was their cultivation so that they might be available at the time when needed. One trouble with him had been carrying them over the winter.

Prof. Hargitt spoke of a fungous disease which had attacked the canker worm.

Prof. Cook thought the greatest difficulty in making use of contagious diseases for the destruction of insects was the fact that the insects which it was desired to treat were not always in a susceptible condition.

Prof. Garman thought that although fungous diseases were difficult to introduce, bacterial diseases would probably be more controllable.

The meeting adjourned till 5 o'clock.

Prof. Atkinson spoke on the "Injurious Insects of Alabama." A bud worm had been extremely injurious to young corn, piercing the central shoot and destroying its growth. *Diabrotica 12-punctata* had

also been injurious in the same manner; and, if there were not sufficient food in the stem, the larvæ descended to the roots and tunnelled out irregular channels on the surface. They pupated in the ground. A new attack had been observed on the "Irish potato," viz, by the Cabbage Plusia, which had attacked the leaves. The same insect had been very injurious to cabbages. In the Southern part of the State more harm had been done by the Plusia than by the cabbage worm. At Mobile farmers had complained that 50 per cent. of their melons had been injured by a worm. *Scolytus rugulosus* had been very abundant at Auburn in the spring, attacking trunks which appeared to be perfectly sound. Onions had been badly injured by a species of Thrips. Another species had also been injurious to cotton plants.

Prof. Cook stated that he had also seen a Thrips injuring onions in Michigan.

Prof. Webster stated that he had studied *Scolytus rugulosus* and had found that it invariably attacked trees which were injured. In a single instance, where the beetles had commenced operations on a sound tree, he found that they afterwards left it.

Prof. Cook made some remarks upon the effect of mild winters upon insect presence. He had found cut-worms and saw-flies very abundant in Michigan during the present season. He had also bred a new borer from the black currant, *i. e.*, the small longicorn beetle *Hyperplatys maculatus*. He had also found that the larvæ of *Aegeria tipuliformis* had been largely destroyed by a fungous growth like that of the white grub. The leaves of cherry, pear and quince had been badly attacked by the larvæ of saw-flies, but they had been easily kept in check by applications of road dust.

Dr. C. M. Weed presented a paper upon the ".Oviposition of *Dectes spinosus* upon *Ambrosia trifida*." He also gave some account of the insect, in all its stages, from specimens which he had bred.

During the meeting a most interesting set of photographs was exhibited by Prof. Webster, showing a likeness of Thomas Say, his birthplace, the house where he lived during the greater part of the time he was writing his works, his tomb and an autograph. Prof. Webster had a few sets of the photographs struck off when his own were printed and is willing to let entomologists have them at the actual cost of production.

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 208, Volume xxii.)

H. roseata Wlk.

1866—Wlk., App. to anc., 336 (?), *Halisidota.*

cinnamonea Bdv.

1868—Bdv., Lep. Cal. lg., XII.), 80, *Phægoptera.*

1869—Grt. & Rob., T Soc., III., 175, *pr. syn.*

Habitat—Vancouver, (

As the description of thi... readily accessible to students, I reproduce it here :—

"Female rosy red; body hed, and partly pale yellow beneath; head with a pale n the front; palpi extremely short; thorax with six longit llow streaks; abdomen rosy, lanuginous and partly yellow to the base, extending much beyond the hind wings; fore wings with some pale yellowish streaks toward the base, with three exterior whitish macular, very oblique bands; spots mostly cuneiform; costa straight; tips slightly acute; exterior borders slightly convex, extremely oblique; first and second inferior veins contiguous at the base; third very near the second; fourth remote from the third; hind wings whitish cinereous, slightly hyaline; veins and fringe slightly yellowish. Length of the body, 7 lines; of the wings, 20 lines.

"This species may form a new genus. It differs somewhat from *Halisidota* in the structure of the veins of the fore wings."

H. scapularis Stretch.

1885—Stretch, Ent. Amer., I., 106, *Halisidota.*

Habitat—New Mexico.

H. significans Hy. Edw.

1888—Edw., Ent. Amer., III., 182, *Halisidota.*

Habitat—New Mexico.

H. sobrina Stretch.

1873—Stretch, Zyg. and Bomb., 87, 135, pl. VI., f. 10, ♂, *Halisidota.*

1873—Edw.*, Proc. Cal. Ac. Sci., V., 369, *Halisidota.*

Habitat—California.

Food-plant—*Pinus insignis.*

H. tessellaris Sm. Abb.

1797—Sm. Abb.*, Ins. Ga., II., 149, pl. 75, *Phalæna.*

1816—Hbn., Verzeichiss, 170, *Halisidota.*

1837—Geyer, Zutr., No. 470, ff. 939–940, *Halisidota.*

1833—Harris, Cat. Ins., Mass., 592, *Arctia.*

1841—Harris*, Rept. Ins., Mass., 260, *Lophocampa.*

1856—Wlk., C. B. Mus., Lep. Het., III., 732, *Halisidota.*

1860—Clem., Proc. Ac. Nat. Sci., Phil., XII, 534, *Halisidota.*

1862—Morris, Synopsis App., 348, *Halisidota.*

1862—Harris*, Inj. Insects, 364, *Lophocampa*

1863—Saund.*, Syn. Can. Arct., 19, *Halisidota.*

1864—Walsh*, Proc. Bost. Soc. N. H., IX., 289, *Halisidota.*

1870—Walsh*, Am. Ent., I., 205, *Lophocampa.*

1873—Stretch*, Zyg. & Bomb, 87, 137, pl. VI., f. 9, ♀, *Halisidota.*

1882—Grote, New List, 16, *Halisidota tessellata.*

antiphola Walsh.

1864—Walsh*, Proc. Bost. Soc. N. H., IX., 288, *Halisidota.*

1864—Walsh*, Proc. Ent. Soc., Phil., III., 412, 413, *Halisidota.*

1864—Grt., Proc. Ent. Soc., Phil., III., 536, *pr. syn.*

1865—Walsh, Proc. Ent. Soc., Phil., V., 197, *pr. syn.*

var. harrisii Walsh.

1864—Walsh, Proc. Ent Soc., Phil., III., 430, *Halisidota.*

1865—Walsh, Proc. Ent. Soc., Phil., V., 197, *pr. var.*

1870—Walsh, Am. Ent., I., 205, *Lophocampa.*

1873—Stretch, Zyg. and Bomb., 137, *pr. var.*

Habitat—Canada to Texas; Illinois, Indiana, Missouri.

Food-plants—Oak, sycamore, beech, hornbeam, plane.

H. trigona Grt.

1879—Grt., No. Am. Ent., I., 46, *Halisidota.*

1881—Grt., Trans. Kans. Ac. Sci., VII., 64, *Halisidota.*

Habitat—New Mexico.

Genus EUHALESIDOTA, Grt.

1865, Grt., Proc. Ent. Soc., Phil., V., 243.

Head moderate; eyes large, not prominent; tongue of medium length, corneous; palpi short, scarcely exceeding the front; terminal joint very short; antennæ long, in the male heavily pectinated; legs increasing in length posteriorly; spurs normal in number and moderate in length.

In venation I can find no notable differences from *Halisidota*, and the only examined species, *longa*, alone considered, I cannot find *any* difference save in the wing form. In *Euhalisidota* the primaries are longer and more pointed. Mr. Grote, in describing the genus originally, had only a single rubbed female before him, and pointed out some distinctive characters which seem inconstant.

E. longa Grt.

1880—Grt., CAN. ENT., *alisidota*.

Habitat—Florida.

E. pura Neum.

1882—Neum., Papilio, II., 1 *sidota*.

Habitat—Arizona.

Genus A ICLI Grt.

1882—Grt., Trans. Kans. ., 46.

Eyes hairy, head produced; ypeal vestiture conceals the small palpi; abdomen short, male æ pectinated; wings rather long and narrow, entire, sub-diaphanous. Cell in primaries closed, veins 3–5 arising near together.

The above genus is unknown to me, and the characters given are from Mr. Grote's description, and all that he gives. He says, "In placing it among the *Arctians* I have probably not found its best place." No family characters are given, so it is impossible to guess where the genus belongs. The neurational characters given are as much *noctuid* as *arctiid*, while the origin of vein 8 of secondaries, which would have probably decided the propriety of its reference to the *Arctians*, is not mentioned at all. In fact, except by the identification of the species, the genus is not recognizable. The species is *A. aspersa* Grt.

1882—Grt., Trans. Kans. Ac. Sci., VIII., 46., *Alexicles*.

Habitat—New Mexico.

I have now gone over all my notes in the family. The bibliography is probably not complete, but it embraces references to the descriptions of all the species and nearly all the genera. By far the greater number of references are original, and nearly all have been verified. The notes on the structural characters have gradually accumulated, as I rarely lost an opportunity of making an examination of a species coming into my hands, nor of noting the contents of books which I found occasion to examine in my studies on the *noctuidæ*. In arranging the *Arctiidæ* of

the National Museum collection it became necessary to examine some of the species for determination, and the facts gleaned in this way were noted. The localities given are very incomplete, as here I failed. I neglected localities for structure, and the list does not, therefore, give a fair idea of the distribution of many of the species.

The economic literature has been almost entirely omitted, since it rarely became necessary for me to refer to it. Mr. Hy. Edwards's list of the early stages will supplement the present catalogue in this respect. The object sought here is to bring within reach of the student the knowledge of where the literature of the family can be found, if he desires to study it systematically. I have also given my own observations which may serve as a starting point for others, and may aid in determination and a knowledge of the characters upon which the genera are based.

SYNOPSIS OF GENERA.

1. Front tuberculate or roughened 2
   Front smooth 3
2. Anterior tibia unarmed; accessory cell wanting ..... *Cydosia*
   Anterior tibia with a claw at tip; primaries with an accessory cell ..... *Cerathosia*
3. Vein 5 of secondaries wanting or very faint 4
   Vein 5 of secondaries present 5
4. Primaries long and narrow, secondaries broad and large .... *Emydia*
   Primaries broad, secondaries smaller, proportionate ..... *Crocota*
5. Vein 8 of primaries wanting; 11 veins 6
   Vein 8 of primaries present; 12 veins 7
6. Vein 10 of primaries from the subcostal; 3 and 4, and 6 and 7 of secondaries stalked ..... *Gnophæla*
   Veins 7 to 10 of primaries on a stalk out of the end of the cell; veins on secondaries not stalked ..... *Epicallia*
7. Vein 10 of primaries from the subcostal 8
   Veins 7 to 10 of primaries stalked out of the end of cell 13
8. Accessory cell present on primaries 9
   Accessory cell wanting on primaries 10
9. Antennæ of ♂ bipectinated ..... *Nemeophila*
   Antennæ of ♂ with single lateral bristles only.
   Primaries narrower, parallel, apices rounded; secondaries large, broad ..... *Utetheisa*

Primaries broader, trigonate, apices marked; secondaries proportionate ..... *Callimorpha*

10. Tongue weak and short 11
Tongue moderate or long 12

11. Fore tibia with a small spine at tip, wings broad and large.. *Euprepia*
Fore tibia unarmed.
Wings broad, size large ..... *Platarctia*
Wings moderate, size s ..... *Arctia* / *Callarctia*

12. Primaries broad, apices , secondaries proportionate ..... *Euchætes*
Primaries broad, apices p ite, secondaries small ..... *Eupseudosoma*
Primaries narrow, with d apices, secondaries still smaller ..... *Halisidota* / *Euhalisidota*
Primaries still narrower, si ..... *Nelphe*

13. Vein 8 of secondaries wanting ..... *Euerythra*
Vein 8 of secondaries present 14

14. Median spurs of hind tibia wanting 15
Median spurs of hind tibia present 18

15. Anterior tibia armed at tip 16
Anterior tibia unarmed at tip 17

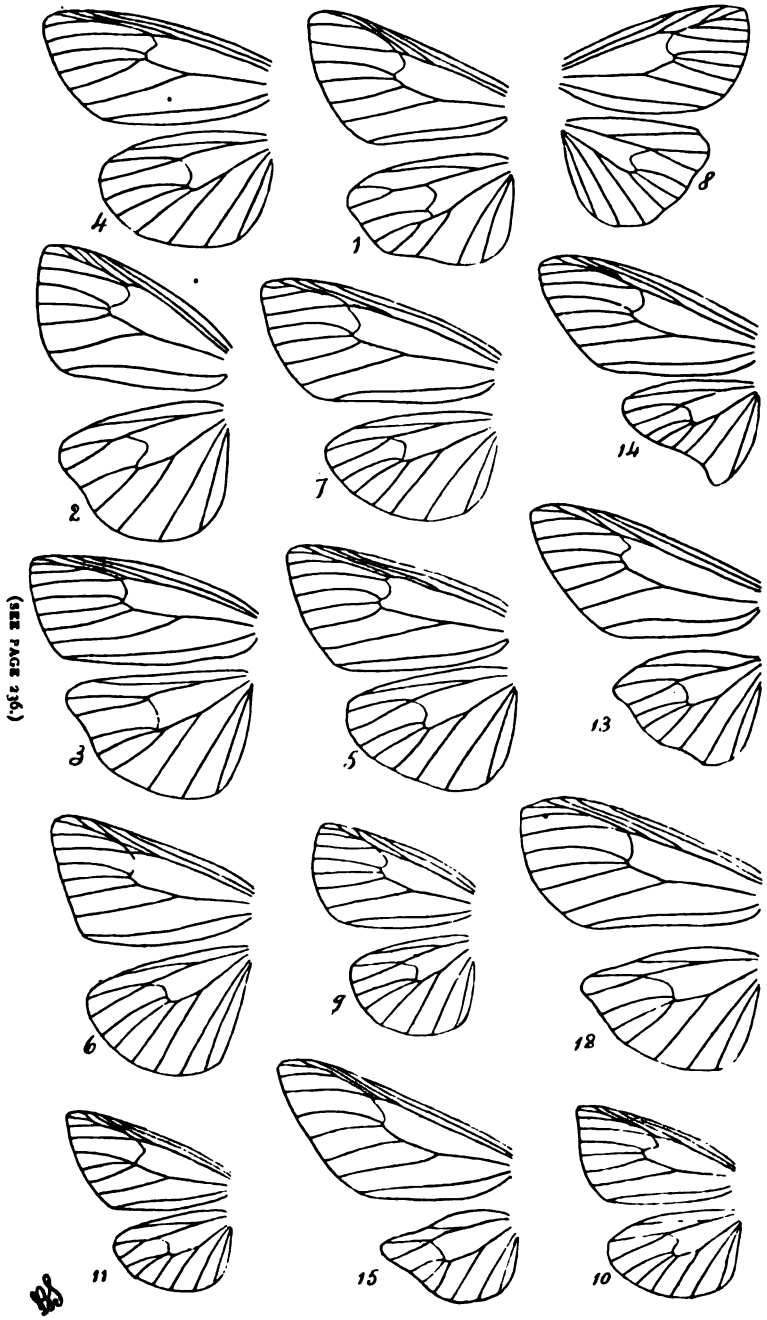
16. Tibial armature consisting of a long claw ..... *Seirarctia* / *Ectypia*
Tibial armature consisting of a stout spine each side of tip; ♀ antennæ pectinated ..... *Leucarctia*
Tibial armature consisting of a small spine at each side of tip; ♀ antennæ simple ..... *Hyphantria*

17. Primaries broad and obtuse, secondaries proportionate.... *Leptarctia*
Primaries long, apices acutely produced; secondaries small, caudate ..... *Ecpantheria*

18. Antennæ of ♂ pectinated 19
Antennæ simple in both sexes 20

19. White species with more produced apices ..... *Spilosoma*
Tawny species with broader, more obtuse wings ..... *Antarctia*

20. Primaries narrow, elongate, apices acute; secondaries rounded; vestiture dense; color tawny ..... *Pyrrharctia*



(SEE PAGE 236.)

Primaries broader, apices marked, but hardly acute; vestiture thin; color reddish.....*Phragmatobia*

Primaries still broader, apices long acute; secondaries subcaudate; size large .....*Arachnis*

The synopsis shows plainly the close relation of some of the genera, though the series is arbitrary in its arrangement. Excluding the *Cydosiinæ*, which perhaps ncy to the Noctuidæ, we have two fairly distinct series. re find a usually small head, somewhat retracted, and m lete tongue. The antennæ are moderate in length or short. series, the head is larger, more free, the tongue stronger and e antennæ are usually longer and more prominent. The origin of vein 10 serves as a good basis of division, and nds to some extent with the other characters. The entire further revision. The genera allied to *Arctia* are scarcely inguished, and so *Euhalisidota* seems scarcely distinct from

Melanchroia, *Daritis* and *Kodiosoma* are not included in the synopsis. *Ectypia* and *Nelphe* are placed partly by guess, from lack of types for examination.

Eupseudosoma has been sent me by Mr. Conradi, and is a close ally of *Halisidota*, differing in the broader primaries, and very long oblique outer margin.

Finally, the present paper consists rather of a series of notes preparatory to a study of the family, than a critical study. With a good collection at hand, there should be no difficulty anywhere in the family, except perhaps in *Halisidota*.

EXPLANATION OF PLATE.

1. Venation of *Gnophæla hoppferi*.
2. " " *Crocota ferruginosa*.
3. " " *Utethesia bella*.
4. " " *Epicallia virginalis*.
5. " " *Euprepia caja*. *Arctia* does not differ.
6. " " *Nemeophila*.
7. " " *Seirarctia echo*. *Leucarctia* and *Pyrrharctia* do not differ.
8. Venation of *Phragmatobia rubricosa*.
9. " " *Antarctia vagans*.
10. " " *Spilosoma virginica*.
11. " " *Hyphantria textor*.
12. " " *Euchætes egle*.
13. " " *Arachnis picta*.
14. " " *Ecpantheria scribonia*.
15. " " *Halisidota caryæ*.

Cydosia and *Cerathosia* were figured in the Proc. U. S. Nat. Mus. for 1888; *Callimorpha* and *Euerythra* were figured in the same publication the year previous.

NOTES ON COLEOPTERA—NO. 6

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Corymbites nigricornis Panz. *(metallicus* Payk. *nitidulus* Lec.) This species is widely distributed in North America, from Hudson Bay to Massachusetts, and westwardly to the Rocky Mountains, through which it extends to New Mexico. It also inhabits Siberia, Central and Northern Europe. The typical form (European) is described as metallic black, with the two basal joints of the antennæ and the feet rufous. The American forms found in Northern Michigan and at Sudbury, Ontario, agree with this description, except that I have seen no example with more than the first basal joint of the antennæ rufous. Moreover, specimens occur with the hind angles of the thorax rufescent, and the feet varied in different ways from rufous to entirely brown. From the more southern parts of Canada and from Massachusetts comes a form with a narrow margin and the hind angles of the thorax, its inflexed sides, the prosternal lobe, the epipleura of the elytra, sides of the abdomen and narrow posterior margin of the ventral segments rufous; the feet varying in colour, as in the typical forms.

Except in colour there appears to be no other separative, but this is so striking that it is not obvious, without some study, that the forms are all one thing. No such variation seems to have been recorded among the European forms.

Petalium bistriatum Say.—This is a very small thing, from .04 to .08 inch in length, black, with rufous feet and antennæ, and is frequently beaten from bushes by the collector. There is a form raised abundantly from dead hickory of two years, that is entirely castaneous, with the other characters noways different, except that the dorsal striæ of the elytra are fairly well marked, the intervals with rows of fine soft hair, and the 8th joint of the antennæ, though still short, can be seen in life with a lens; whether this is sufficient difference to be the basis of another species is left to the future monographer. The genus is readily known from all others in this difficult family by the large metasternum projecting forward separating widely the middle coxæ, and by the second ventral segment of the abdomen being as wide as the remaining three conjointly. The insects of this family have a very provoking habit of tucking away the antennæ and folding the legs so as to elude observation without a trouble-

some process. I find it very satisfactory to collect them alive and to place them on the slide of the microscope in a drop of chloroform, which quiets them for a minute, and when reviving the antennæ and legs are extended slowly and may be seen rather better than by dissection.

Raised from the same wood with the above was a specimen of *Hadrobregmus* .18 inch long wit antennæ, which if not *pumilus* is a new species, the size principal difference observed.

Several examples of *Xy* *s* were likewise bred from this wood.

Purpuricenus axillaris Hald. (Tr. An Phil. Soc., X., 31).—This fine species is not uncommon here, and this season numerous examples were bred from hickory wood deadened two years and one-half ago. In the catalogue it is set down as a variety of *humeralis* Fab., but the reason is not very obvious. It is smaller, .45 to .65 inch, (Haldeman gives, .50 to .75 inch, but in over 100 examples I never saw one over .65 inch, .50 to .55 inch being the usual length); cylindrical in outline; thorax moderately foveate-reticulate; elytra sparsely moderately punctured on the basal third, which is mostly of a pale lemon color to orange yellow; the apical two-thirds is entirely black, the anterior portion of which is punctured a little more finely than the yellow portion, and the posterior very finely and densely; a black hair arises from each puncture forming a dense pile that completely conceals the punctuation; the underside is moderately finely sparsely punctured; the black and the yellow portions of the elytra are separated transversely by an irregular border, though the black has no tendency to advance along the suture, but rather the reverse.

Humeralis is larger, .70 to 1.00 inch, considerably depressed and broader in proportion to the lengths; the thorax is very rugosely foveate-reticulate; the elytra on basal third are coarsely sparsely deeply punctured; the punctures on the apical black part are somewhat finer but not dense, and are not concealed by the black hairs; the underside is coarsely punctured; the apical black of the elytra advances normally along the suture to the scutellum, leaving a triangular basal space on each side extending to the marginal third of a bright scarlet color, but sometimes orange. In some individuals the basal spot becomes dilated posteriorly so as to be separated only by a black sutural line, and then the specimen

resembles *axillaris*, but only in coloration. To me they are separate species.

Dorcaschema nigrum Say.—This species requires two years for development, breeding in dead hickory limbs, from a barrel of which more than 500 specimens were obtained from June 3rd to 25th. The larvæ live under the bark till May of the year in which the beetle appears. As the time for pupation approaches they develop an enormous appetite and eat broad cavities in the wood under the bark through which their dust is ejected by a perforation. Some of them pupate in these cavities in which they partition off a suitable space with a wall of compacted dust; but the greater number bore obliquely into the wood to a greater or lesser depth and distance and then outwardly again till near the surface, packing their burrows solidly. The larvæ do not bore entirely to the outside, but stop short one-eighth to one-sixteenth of an inch, leaving the remainder of the wood and the bark to be cut through by the matured beetles, which are just as capable of boring a hole as the larvæ. And in this connection I would state that I have ascertained this season that in the case of Saperda Fayi and S. concolor, the beetles, and not the larvæ, bore the holes to escape by. In the pupa state the very long antennæ are coiled into a spiral of three and lie on the wing pads. In the development probably one-fourth of the beetles are unable to free the entire antennæ from the envelope and appear with one or both deficient in some of the external joints.

Tymnes metasternalis Crotch.—This species appears to be rare among collectors. Crotch described it from Illinois briefly: "Very similar to the preceding [tricolor, the bronze variety], but elytra more sparesly punctate, subcostal; metasternum and ventral segments closely and deeply punctate. L. .22 inch." This season I took twenty-five examples of a form that suits this description well enough, except that in length they measured from .16 to .19 inch, which represents a much smaller insect, but which for the present may bear the name. In *tricolor* the metasternum is scarcely sparingly punctate and highly polished, and there are scarcely any abdominal punctures. This, with the much larger size and more convex form, are sufficient distinctions. With *Rhabdoptera picipes* Oliv. (*Colaspis prætextata* Say) it may be very readily, and probably is, often confounded, as they are nearly of the same size, colour and sculpture, but the underside of *picipes* is smooth like in *T. tricolor* and the tibiæ are not

produced at the apex to a point. The beetles were beaten from a small *Cratægus* growing in a fence corner at the edge of a large grove on June 2nd, 6th and 12th, many of them paired; other bushes of the same species nearly yielded none. *Tymnes tricolor* is rather abundant, varying in the colour and sculpture of the upper side; the bronze coloured is the largest and roughest, occurring in June and July, usually on chestnut; the green variety is found a[illegible]on hickory, individuals being sometimes bright blue and a[illegible]e bright coppery. I once took two of the green variety earl[illegible]bernation, though this is probably an exception to its habit.

Tymnes chrysis Oliv.—This specie[illegible]n found is abundant, but it seems to occur in localities. So far[illegible] has been taken on hickory sprouts growing from stumps, an[illegible] in June and July. As it has not been described in American worl[illegible]e a translation of Olivier's: "*Golden-green, thorax and elytra pu[illegible]; antennæ and feet rufous.* Like *T. viridis;* antennæ, palpi, labrum above and feet rufous; body green or brassy-green. Sometimes brassy-green, brilliant, shining; head, thorax and elytra punctate. New York, Georgia." Oliv., Vol. 6, 886, No. 16, and figure. *T. viridis* Fab. is the green form of ***tricolor***, which is more brilliant in the Southern States, whence were Olivier's specimens. Olivier's description is applicable as far as it goes, but a greater abundance of material shows more variation. The large majority of examples are greenish blue to cobalt blue, while violaceous and bright coppery individuals occur; in some examples the thorax is of one of these colours and the elytra of another; the antennæ are often darker outwardly; the femora are usually piceous black, with the tibiæ and tarsi pale. This is varied in different ways, and sometimes all are piceous. The underside is black or piceous, shining, sparsely, finely and irregularly punctate. Length .18 to .20 inch. This species has the thorax and elytra smooth and rather closely and evenly punctate, and without the elytral rugosities of the other species, and arranged by this character it would be the first or the last of the series.

Rhabdoptera (Colaspis) picipes Oliv. (*prætextata* Say).—Olivier describes his *picipes* as having the thorax *finely* punctured, and as being a little *larger* than *Tymnes* (*Colaspis*) *viridis* Fab., the green variety of *T. tricolor.* It is difficult to find a North American insect in full accord with this description if rigidly interpreted. The bronze form of

T. tricolor with which it has been united has the thorax not very coarsely but still not finely punctured, and in this respect does not quite answer, though usually a little larger than *viridis*.

Rhabdoptera prætextata Say, with which Dr. LeConte formerly united it, and more recently Dr. Horn, with the precedence, has the thorax punctured as in *tricolor*, and is too small by nearly one-half. Olivier's description translated is: "*Beneath piceous; above shining, fusco-æneus; antennæ testaceous, apex black, a little larger than C. viride* Fab. Antennæ testaceous, last two joints fuscous; body above shining, beneath piceous; thorax finely punctate; elytra punctate with confluent punctures. Throughout Carolina." A figure accompanies this description.

This is as good a description of the bronze form of *tricolor* as Olivier gives of either *viridis* or *chrysis*, and as the same exactness of expression did not prevail then as now, the really not very coarsely punctured thorax might have been considered fine by him. It seems scarcely just to Mr. Say to supercede his name, accompanied by a fairly good description, by one that, according to the describer, applies to an insect nearly twice the size and which, like a hermit crab, has been wandering about a long time in search of a suitable shell. In neither of the two species are the elytra confluently punctured. This species is distributed from Canada to Florida and westward to the Rocky Mountains. It occurs here abundantly on the *Vitaceæ*, especially the wild grape.

There is an undescribed species of *Colaspis* or *Rhabdoptera* (if the genus is valid) found in North Carolina, of which I have examples, which is of the proper size to suit the description of *picipes*, has the elytra what may be termed rugosely punctured, and the thorax scarcely more coarsely than *tricolor* or *prætextata;* but it is brilliantly green above. There may, however, be examples, as in nearly all similarly coloured insects, of bright golden or coppery individuals, and if so, it would fit Olivier's description better than either of the other species. There is a difficulty that must be met, or satisfactorily explained, before there can be certainty in any assignment, that is; the name "*picipes*," and the statement that the underside is "*piceous*." Olivier, in describing the other species, names the colour of the legs, which he here does not do, and the legitimate inference

with the name given is that he had before him an insect with dark legs, which neither of the species mentioned nor the nondescript has, and with little tendency to in any individual observed. Possibly the insect described may belong to some foreign country.

Haltica ignita Ill.—This species is so protean in colour, form and in the wide range of the veg[illegible] that it is difficult to believe all the forms included under [illegible] belong to one species till one looks for tangible structura[illegible]t has a very extended distribution, from the Hudson I[illegible] Florida and Texas, and was described by Dr. LeConte, from [illegible]ipson, on the McKenzie river, under the name *inærata*. It is easily [illegible]arable into at least three races, two of which occur here in the gr[illegible] abundance. The first is the typical form, having the upper s[illegible] brilliant golden-copper colour, though individuals occur wit[illegible]reen. It is found during May on Azaleas growing among [illegible]. A colour variation of this form is found at the same time on Kalmia, with the upper side entirely green, individuals occurring of a coppery and violet colour, or with the thorax violet, or coppery and the elytra green. The length of this form is from .14 to .17 inch; the punctuation of the elytra is comparatively coarse and not very close.

The second form is much smaller, .11 to .13 inch in length; the punctuation of the elytra is finer and less distinct; the form is less elongate, and more depressed; the colour of the upper side is either green or violet, but individuals occur with all the variations of the preceding. It appears here about the first of June and depredates on the Rosaceæ, seeming to have a special fondness for the wild plum, wild cherry and wild strawberry. I have this variety from New Jersey, Florida and Texas; the preceding, from Wisconsin, Michigan and Canada. Dr. Horn, in his Monograph of the genus, mentions a deep blue race, and likewise a brown race without metallic lustre, as occurring in Florida, but I have met with neither. This species is distinguished from all others except *chalybea* and *nana* by the *deep* ante-basal groove of the thorax, which extends *completely* across to the marginal depressions.

Mailed November 5th.

The Canadian Entomologist.

VOL. XXII. LONDON, DECEMBER, 1890. No. 12.

THE HABITS OF THE POMEGRANATE BUTTERFLY (VIRACHOLA ISOCRATES) OF INDIA, AS RECOUNTED BY DE NICEVILLE, (BUTT. INDIA, III., 478–481).

LARVA .8 of an inch in length when full grown; ground-colour blackish-brown, the constrictions between the segments well marked, the head comparatively large, fuscous, covered with rugosities or short semi-circular tubercles, the segments rapidly increasing in size to the fourth, then gradually tapering to the thirteenth, which latter is about as wide as the second segment; second segment anteriorly flesh-coloured, the third segment entirely flesh-coloured, the seventh and eighth bearing a large dorsal square flesh-coloured patch, the three anal segments scutate, all the segments widely pitted and covered with short but coarse black bristles, which are more numerous at the sides and whitish. This larva is very ugly, to be accounted for, perhaps, by its passing its life out of sight in the interior of a fruit. In Calcutta I have reared the larva on the fruit of the *Randia dumetorum* Lamk., which belongs to the Madder family *(Rubiaceæ)*. I once found a larva in the fruit of the Loquat *(Eriobotrya japonica* Lindl.), of which it ate the hard central seed or stone only. It emerged on April 4th. Messrs. F. E Partiger and E. C. Cotes have bred it from the fruit of the Guava *(Psidium guava* Raddi.). Its usual food appears, however, to be the fruit of the pomegranate *(Punica granatum* Linnæus).

PUPA of the usual lycænid shape, brown, marked with a dorsal and lateral black line, the whole surface very rough, covered with tiny pits, furnished with a few short coarse bristles, which are most numerous round the sharp anterior ridge which encloses the head; the wing-cases pale ochreous; head rounded; anal segment blunt.

"This butterfly [*Virachola isocrates*] resides in the larva state in the interior of the pomegranate, seven or eight at least [This is very unusual. I have never found more than one larva or pupa in a single fruit; two or

three would probably be the maximum ordinarily, even then one or more would probably have to emigrate to a fresh fruit before becoming full-fed], having been reared in the interior of the small fruit now exhibited. Of the mode in which the eggs are deposited by the female in the interior of the pomegranate no information has been received; it is, however, probable that this is effected whilst the fruit is in its very young state. [The eggs are laid by the alyx of the flower of the young fruit.] The caterpillars fe ds and inner part of the fruit, which is thus rendered wea) support its own weight, and consequently liable to have and to fall to the ground with the first wind. This, howev destruction to the inclosed insects since, in all probability nd it impossible to make their escape were the fruit to be rotting upon the ground. To obviate this evil, the caterpi fed, have the instinct to eat a hole [this is incorrectly stated, ays a hole in the fruit for the larva to cast forth its dejections, about a quarter of an inch in diameter through the hard shell of the fruit whilst it remains upon the tree; through this hole they then creep to the stem of the fruit, and spin a white web, which they attach to the basal part of the fruit as well as to the stem, for about the distance of an inch along the latter. This web is sufficiently strong to support the pomegranate from falling after the wind has broken the stem near the fruit

"From the circumstance of this specimen of the fruit exhibited, having as many holes in it as there were caterpillars inhabiting it, it is most probable that the web thus spun is a joint production of the whole. It is curious, as evidencing the instinctive impulses under which each of the inclosed larvæ must have acted, that, instead of availing themselves of the first aperture made in the fruit, each caterpillar should be at the trouble of making a hole for itself, a circumstance which renders it the more probable that all joined in spinning the web.

"But it will be at once asked, what necessity could there be for the caterpillars to secure the fruit from falling after each has bored a hole, and thus made its escape? This question is answered by a curious circumstance that, after so securing the fruit, the caterpillars return again into the pomegranate, in the hollow interior of which they undergo their transformations to the chrysalis state.

"Here, too, we may notice another interesting fact, namely:—that

the insect has the precautionary instinct, which acts as a second inducement, to make the aperture in the fruit in that stage of its existence in which it is furnished with organs best adapted for the purpose, for, had the larva omitted taking this step, the consequence would have been that the poor insect, when come to its butterfly state, would have been a prisoner totally unable to make its escape, being unprovided with any instrument sufficiently powerful to make a hole in the shell.

"The chrysalides are attached horizontally upon the inner walls of the pomegranate by means, first, of a patch of silk laid upon its surface to the centre of which the tail of the chrysalis is attached, and second, of a slender silken thread passing from side to side over the base of the abdominal segments.

"Another curious instance of instinct yet remains to be noticed. The butterfly, so soon as ever it has escaped from the puparium, must make its escape out of the hole formed by the larva. Delay would be death, as the wings would soon acquire their full expansion of nearly a couple of inches, in which state it would of course be unable to creep out.

"In the chrysalis state the belly of the insect is placed in contact with the inner surface of the fruit; consequently, as the slit by which the butterfly escapes out of the puparium extends along the back, the under surface of the latter remains entire, the anterior lateral portions on each side of the slit (extending as far as the whole coverings of the wings), curling up and lying close upon those parts which have covered the breast and limbs, leaving the abdominal portion in the same form as when it enclosed the insect. (*Westwood*, Trans. Ent. Soc. Lond., (I.), ii: I., 1837.

"At the time the pomegranate is in flower, and at a very early period, the Hair Streak may be seen very busily occupied about the flowers, and I have little doubt that the eggs are deposited at the bottom of the calyx, from the position in which I have seen the abdomen of the butterfly placed. As the fruit enlarges the eggs are enclosed, and in this situation matured.

"In order that I might obtain a perfect insect I surrounded several of the fruit with fine gauze, but in such a manner as not in the least to interfere with the caterpillar in its labour of connecting the fruit and stalk by means of the web, but to my astonishment and disappointment this never took place. The caterpillars issued from the fruit, and finding their

escape impeded, underwent their change on the external part, and so soon as this was effected I removed the fruit from the tree for the purpose of placing it in a mosquito gauze house in my room. Subsequently I examined several of the fruit, but I never found any chrysalides or the remains of any inside the fruit. I was very careful in my observations and I came to the conclusion that the caterpillars in this instance deserted the fruit when ready to change." (*Downes*, Calcutta, Journ. Nat. Hist., ii: 408. Professor Westwood is quite correct; there is no doubt that in nature the fly usually pupates within the fruit; on opening these I have found at different times dozens of pupæ or pupæ skins, but never more than one in each fruit. Mr. Downes is also partially right, as if the fruit are cut off the tree and placed in a box the larvæ, when full-fed, will leave the fruit and pupate anywhere on the sides of the box or on the fruit.

There is one interesting question still to be referred to in the life history of this butterfly—is it attended or not by ants in its larval state, and has it the special organs affected by the ants? Mr. W. C. Taylor, of Khorda, Orissa, writes:—"Larva attended by the ant, **Formica nigra**, who clear away their droppings and act as sweepers, as well as guard the pupæ." His daughter, Mrs. Wylly, also writes:—"The larva of *Virachola isocrates*, though louse-like in shape, differs considerably from those of *Catochrysops cnejus*, Fabricius, *Azanus ubaldus*, Cramer, and *Tarucus theophrastus*, Fabricius. The latter are inert and slow, the former is very brisk in its movements, and with the protrusible long neck, small head and strong jaws of a beetle grub, is no doubt well-adapted for the work required in making its home. The length of the larva when full-fed is rather more than an inch, and in colour and shape much resembles a ripe mulberry. It had a glossy, shining skin, very knobby and indented all over, of a blue and purple colour, and its three posterior segments covered with a squarish shield with a raised dingy yellow rim to it. The larva bores for itself when quite young a little clean-cut round hole from the outer rind of the fruit of *Punica granatum* to the heart. In this hole it spends its days with its head inside eating away at the green or ripening pips, and enlarging the hole as it increases itself in size. Sometimes three or four larvæ may be found buried in one pomegranate. When at rest and not eating it plugs up the outer hole deftly with the shield on its tail. It is a curious fact that the ants in the case of this species act as sweepers to the larva, hovering in attendance

round the mouth of each hole and performing all the cleaning out operations with great regularity. The larva never leaves the fruit till full-grown [this is doubtful; I think it often seeks a fresh fruit, as I have frequently found a small fruit with the whole interior eaten and quite clean, and no pupa or pupa-skin, so in all probability the larva which inhabited that fruit had left it and sought another,] and then it descends the bark and seeks some crevice, crack or knot in the stem of the tree, and there undergoes its transformations. The ants, as far as I could see did not convey the larvæ to their nest at the foot of the tree, but as there were many larvæ on the tree and few pupæ, some may have been removed to their nest. [These missing pupæ were probably inside the fruit.] I was unable to find any eggs on the fruit or flowers, nor have I ever observed the ants 'milking' any of the larvæ, nor any appearance of tentacles being present. The larva spins a slight but strong web from its mouth with which it binds the fruit to the stalk to prevent its being blown off by the wind, and later uses the silk to fasten itself to by the tail when ready to change to a pupa. The pupa is also attached by two threads flatly to the trunk, and is of a pinkish-brown colour like the bark of the pomegranate tree, with various speckles and marks of a darker brown, and a dark dorsal line dividing it down the centre. The head of the pupa is covered with a kind of plate rounded in front, straight at the neck." For my own part I have never seen ants attending the larvæ, nor have I been able to find the special organs affected by them, and without these I fail to see why ants should take any trouble for the larvæ.

"It is almost impossible with the net to get a really good specimen of *V. isocrates* or of *V. perse*. They are not only difficult to catch, but exceedingly swift, wary, and given to settling on high trees, but, when caught, difficult to secure without injury. There is a delicate bloom on a fresh specimen which the gentlest touch destroys. It is easily reared however. As is well known, the larva feeds inside the fruit of the pomegranate, and sometime before becoming a pupa eats* its way through the tough rind and fastens the fruit with silk to its stalk, thus preventing it from falling off in case it should wither before the butterfly escapes, as it generally does. This operation is performed at night, and generally repeated night after night. I have taken a pomegranate

*This statement is slightly misleading. From the very earliest stages the young larva makes a hole in the fruit, which it gradually enlarges as it grows, and through which it throws out its dejections. At any period the larva can leave the fruit in which it lives, and in fact not infrequently does so, entering a fresh fruit which suits it better.

infested with these larvæ (several usually inhabit each fruit) and made it stand in an egg-cup; in the morning it was so securely fastened that in taking up the fruit I lifted the cup. Of all animal instincts that I have seen or heard of this is one of the most astonishing and certainly the most difficult to reconcile with any theory of development. As far as I have observed it, the larva never leaves its shelter except for the definite purpose so necessary to [illegible] t taxes ordinary ingenuity to suggest any possible condit[illegible]h some larvæ might have performed the act in the first [illegible]t purpose. I have found this butterfly pretty common i[illegible] l Poona from December or January till March at least." [illegible]te [illegible]rn. Bombay Nat. Hist. Soc., i: 216, n. 46, 1886.)

Mr. F. E. Pargiter in 1881 wrote [illegible]s note:—"The larva [of *V. isocrates*] feeds on the leaves [?] and [illegible]it of the Guava tree. It is rather plentifully clothed with short w[illegible] hair. In the two white spots at the tail are two small horn-like processes, which the larva continually protudes and retracts." This latter note appears to be conclusive as to the larva having the special organs affected by ants and that it is attended by ants, though I have failed to find these.

V. isocrates is very common in Calcutta during the winter, much affecting the flowers of the *Poinsettia*. It appears to occur almost everywhere in the plains of India except the desert tracts, but it is not found in Assam or Burma.

GELECHIA GALLÆDIPLOPAPPI (N. Sp.)

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

Length of body four lines; expanse of wings eight to nine lines.

Head white, eyes black, labial palpi recurved; first joint large and white; lower half of second joint white; upper brown, with white tip; antennæ filiform, ringed light brown and black.

Thorax reddish chocolate in colour; fore-wings rich chocolate red, with a white divided fascia near the hind margin; under side dark grey; hind wings pale silvery grey; fringes grey, with a faint brownish gloss.

Abdomen golden yellow on the upper side of the three first segments, the rest light brown.

Time of appearance the beginning of August.

Described from four specimens bred from galls on *Aster (diplopappus) umbellatus*.

NEW NORTH AMERICAN HOMOPTERA.—II.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

Pediopsis tristis n. sp.

Cinerous varied with fuscous; apex of the front and basal angles of the scutellum black; pronotal rugæ distinct. Length 4½–5 mm.

MALE.—Face with coarse rugose punctures, arranged in oblique lines on the base of the front; front black, cinereous at base and next the eyes, with a broad, curved, transverse white band, including the ocelli; clypeus, loræ and cheeks whitish, the former sometimes tinged with pale green. Form of the pronotum about as in *insignis;* cinereous clouded with fuscous on the apex and along the posterior margin, with an elongated black spot behind the inner angle of the eye; rugæ composed of profound elongated punctures. Scutellum obliquely punctured on the disc; cinereous, with a brownish central band, and black triangular spots within the basal angles. Elytra uniform greyish-brown, subhyaline; nervures strong, evenly margined with fuscous. Wings pale smoky hyaline, nervures brown; beneath whitish; intermediate pectoral pieces with a large black spot, a smaller one just below the propleura, and on the latter a minute dot. Venter dull yellowish, obscured next the connexivum and toward the apex; tergum more or less embrowned. Legs pale; sides of the femora and tibiæ, and tips of the tarsi brown or blackish-brown. Plates ligulate, narrowed and somewhat recurved toward the apex; black or piceous, fringed outwardly with long white hairs. Pygofers white, with a narrow black apical margin, meeting on the ventral aspect almost to their tips, leaving a slightly oblique orifice.

Described from three males collected by Prof. Herbert Osborn at Fairfax, Iowa, June 22nd and 24th, 1889, to whom I am indebted for specimens of this and a number of other interesting western forms.

This sombre coloured species is most closely allied to my *insignis*, from which it may be distinguished by its heavy margined elytral nervures, the large black spot on the apex of the front, and by the rough appearance of the pronotum, contrasting strongly with its peculiar velvety look in *insignis*. Unfortunately there are no females at hand from which to complete this specific diagnosis but there can be no risk in establishing the species on one sex only.

Pediopsis insignis is now known to me from Kansas, Iowa, Michigan,

New York and Ottawa, Ont. It appears to be subject to very little variation.

Thamnotettix lurida n. sp.

Form of *T. subænea;* pale yellow marked with fulvous; elytra deep fulvous, with a whitish commissural spot. Length 5 mm.

Vertex but little long[illegible] than next the eye; surface covered with deep obliq[illegible] emit the broad margins and medial line, and near the [illegible] on either side, is a minutely punctured area. Pronotum [illegible] rinkled. Face fulvous; a large spot on the apex of the front[illegible] ve lateral transverse arcs, pale yellow. Vertex and pronotum [illegible] rish; the former with a transverse band connecting the ocel[illegible] er, with the lateral angles and four more or less distinct lor[illegible] nds, fulvous. Scutellum pale, with the basal angles and two small s[illegible] between them fulvous. Elytra deep fulvous, opaque, especially on [illegible] clavus and base of the corium. A large commissural spot near the apex of the clavus, and some smaller, indistinct ones on the discal areoles of the corium whitish. Abdomen and all beneath deep fulvous ♀, or blackish ♂; the pleural pieces and connexivum edged with pale; legs and genitalia of the ♂ fulvous.

Described from two examples, a ♂ received from Prof. Osborn, labelled "Ames, Iowa, May 19th, 1881," and a ♀ from Mr. G. C. Davis labelled "Agricultural College, Mich., Oct. 24th, 1888."

This pretty little insect is very near my *T. subænea* from California, but it is broader and shorter; the vertex is not so long as in that species, and with the pronotum is distinctly wrinkled; the elytra are deeper coloured and almost opaque; the valve of the ♂ is produced medially in a short blunt tooth, and the plates are broader, especially toward their slightly divergent tips, and are less heavily fringed. In the ♀ the central tooth on the hind margin of the last ventral segment is narrower and more acute than in its ally.

T. subænea and *lurida* are characteristic of neither this genus nor *Athysanus*, to either of which they might be referred. Genus *Phlepsius* could, perhaps, be modified so as to include them, as they want only the elytral reticulations of being very good Phlepsiids. From *Scaphoideus* they are debarred by their shorter antennal setæ and broader form. For a note on this genus see Entomologica Americana, Vol. VI., p. 52.

SUBDIVISION OF GENERA.

BY G. H. FRENCH, CARBONDALE, ILL.

I was pleased to see Mr. Cockerell's article on this subject in the September number of the CANADIAN ENTOMOLOGIST, and hope we may hear from others on the question. It seems to me that a genus should, as far as possible, represent a natural division of a group of plants or animals so distinct from other groups that the species forming the genus are easily referred to it. In botany we recognize at a glance such natural genera as *Carex*, *Rosa*, *Quercus*, etc. The fact that the first of these is a large genus is, it seems to me, no good reason why any subdivisions of it should be called genera, for each plant in any one of the divisions is as much a *Carex* as any other one. If the genus is too large to suit the convenience of the practical worker in some part of his work, I have no objection to a subdivision of the genus into groups; in fact every botanist knows that the species do readily divide into such groups. Perhaps it is best to give names to these group divisions instead of numbers or letters as is sometimes done. The main objection I can see to this is that some one, in labelling the specimens in his cabinet and in making his exchanges, will use these names as generic, leading to more or less confusion.

But what is the custom among systematists in different groups of natural history? To answer this question I turn to a few works that come to my hand, and find the following:—

In Botany I find that Wood divides *Carex* into two groups without names; the genus Aster into four groups with names. Mann's Catalogue makes no division of the genera; published 1868. Gray in his "Manual," 1856, subdivides fifty-four genera, using names for the subdivisions, five of these being in the Mosses and Liverworts. In his "School and Field Book" he does substantially the same thing. In his "Synoptical Flora of North America," 1886, he pursues the same plan, the names in most, if not all cases, such as had been used for such subdivisions by some other writer in calling them genera.

In Ornithology I find that Coues in "Key to North American Birds," 1872, makes no divisions of the genera. Baird, Brewer and Ridgway, in "History of N. A. Land Birds," 1874, divide eleven genera by using subgenera names, and divide one genus by sections that are numbered. Mr. Ridgway does the same thing in "Birds of Illinois," 1885.

In Conchology I consulted George W. Tryon's "Structural and Systematic Conchology," 1882. In this a large part of the genera are subdivided into subgenera and subgenus names are used. If space would permit, a review of Mr. Tryon's course in regard to these names would be interesting.

In Hymenoptera I fir[illegible]ckard, "Revision of Fossorial Hymenoptera," divides fiv[illegible]roups by capital letters; published in 1865. Dr. Hem[illegible] "Synopsis of N. A. Wasps," 1875, divides genera into su[illegible]ubgenus names, in a few cases dividing a subgenus into groups and[illegible] names for these groups also. Edward Norton, "Cat. of the Ten[illegible]dæ," 1867–69, uses names in some genera and numbers in others. [illegible]. T. Cresson, in his various publications, divides only a few genera, and part of those are divided with names and the rest by numbers.

In Diptera I find Osten Sacken, in his "Cat. of Diptera," 1878, divides two genera into subgenera with names, the genus *Trypeta* into thirty-seven, and *Chlorops* into six subgenera. I have other works on Diptera, but they were not consulted.

In Hemiptera, P. R. Uhler, "Check List of Hemiptera Heteroptera," 1885, no subgenus names used. The other works I had access to were not consulted.

In Coleoptera only Horn's and Henshaw's Check Lists were consulted, and neither of these use any form of subdivision of genera.

In Neuroptera, Dr. H. Hagen, "Synopsis of Neuroptera of N. A." 1861, divides a few genera by the use of subgenus names, others are divided by reference marks as in analytical keys.

In Lepidoptera I find P. A. J. Duponchel, "Cat. of the Lep. of Southern Europe," 1844, divides large genera for analytical purposes, sometimes using a capital letter. "Accentuated List of British Lep." contains no division of genera; published in 1858. Boisduval and Guenee, "Species General," 1874, divide genera into groups by letters, numbers and reference marks, but do not use names. Guenee in his part of the work does the same thing. Grote, in his new "Check List of N. A. Moths," divides *Apatela* and *Agrotis* into subgenera, using names. This is the list of 1890. His lists of 1875 and 1882 contain some section subdivisions, both with and without names. W. F. Kirby, in his "Cat.

of Diurnal Lep.," 1871, uses no form of division of the genera. Mr. Edwards, as we all know, divides the genera into groups and numbers the groups.

This is enough to show that the custom among the best writers in the various departments of natural history varies. Quite a large majority divide the large genera into some form of groups, indicating the relation of the species to each other in this way, while a few shirk all responsibility of showing such relation by arranging the species in large genera alphabetically. Of those given above who divide genera, about twice as many use subgenus names as divide the genera without using names, several using both methods in the same work, and occasionally in the same genus. I noticed, further, that most of these subgenus names are the names that have been used by some former writer for genera, the one using them for subgenus names having either united the genera himself, or taken the work of some one else in that line. This is in line with what Mr. Cockerell suggests.

A NEW FORM OF CERURA FROM CALIFORNIA.

BY HARRISON G. DYAR, RHINEBECK, N. Y.

Cerura cinereoides n. var. or *n. sp.* Head, collar and tegulæ light cinereous; throax above largely mixed with orange and metallic blue scales, below somewhat paler cinereous; tarsi ringed with black; abdomen concolorous with the thorax, the segments banded behind with paler cinereous, the last segment in the female sprinkled with black scales, the anal tuft in the male nearly white. Antennæ white, the pectinations dark brown, long in the male and diminishing toward the tip; short in the female. Primaries pale, almost whitish cinereous, paler basally, much the colour of *Cerura occidentalis* Lintn., and marked after the pattern of *C. cinerea* Walk. A minute black basal spot on the submedian, a little further on another on the subcostal; an extra basilar row of six small black spots on the nervules in a curved line, three on the costa close together, but separable by a lens, one on median, one on submedian vein and one on internal margin, the latter, in one female, faint. The median band composed of black and a few orange scales is faint, much the colour

of the lower part of that in *C. bifida* Steph. (but not that shape). Its internal border is arcuate in the male, more angular in the female. Its outer border is twice indented, once at median vein and again on submedian. The borders are very faint, hardly to be distinguished from the rest of the band. Beyond the band are a few black scales on costa, median and submedian veins. A minute spot on discal cross vein, visible only in one speci his a very obscure undulated diffuse line, hardly to be d ll in the male, and a crescenti-form line, darkest on the ing the abbreviated blackish subterminal band, which is b sta, narrows to the first median venule and borders slightly the cresc m line to internal margin. In this line are a series of small venular e spots, and it is preceded by a row of seven small venular black s he one on the costa elongated, those opposite the cell faint. Term ntervenular spots very small, about as in *C. aquilonaris* Lintn.

Secondaries white, with black discal spot and small terminal spots.

Beneath primaries paler than above, shaded with black to correspond with the bands. Secondaries white. Both wings have a large discal black spot, and the terminal spots larger than above. In the female there is a common macular median black band. Expanse 36–38 mm.

Described from one male and two females from Los Angeles, California.

This species approaches *C. cinerea* most closely of any of the species in Grote's list, but may readily be distinguished by its pale cinereous colour and small marginal spots. Of the species added by H. Edwards * it is not *albicoma* Strk., nor *bifida* Steph., both of which are before me. Prof. Lintner kindly informs me that it can not be near *bicuspis* Bork., as this is allied to *borealis* Bd., and it can not be *scolopendrina* Bd., as the author describes this as having the wings and collar white—" ses ailes sont d'un beau blanc ainsi que le collier." †

The species, therefore, seems distinct. Since writing the above I have had the opportunity of comparing the larva of this form with that of *C. cinerea*, and find the difference between them to be so slight as not to

* Ent. Amer., Vol. III., p. 231.

† Lep. de la Cal., p. 86.

warrant specific separation. *Cinereoides* is the California form of the species, of which *cinerea* is the eastern form. The marked difference in the colour between the two is the same as in other species which are found from the Atlantic to the Pacific, as for example *Triptogon modesta* Harr., and its variety or form *occidentalis* Hy. Edw. I shall refer more fully in another place to the larval stages of *cinereoides*.

PREPARATORY STAGES OF TOLYPE VELLEDA, STOLL.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Cylindrical, ends rounded; .06 inch long by .04 inch in diameter, smooth. Colour chestnut-brown. Duration of this period about 195 days.

Young larva.—Length .15 inch; cylindrical, a little larger at anterior part; each joint with six tubercles from which arise spreading hairs, varying in length from short ones, that are not longer than the diameter of the body to those that are as long as the body, the two kinds distributed over the whole body; the short ones white and long ones grey; the longest hairs at the anterior and posterior parts of the body a little longer than the long ones on the middle; colour grey, black. Duration of this period three days.

After 1st moult.—Length .22 inch. Colour lead gray; a dorsal line of this colour bordered each side by a pale yellow, not clearly defined, line that is more or less obsolete on the thoracic joints; a subdorsal line of orange-yellow spots, connected by a pale yellow line; two lateral lines of pale yellow; tubercles small, black, those on joint 2 make a sort of collar for the head; hairs pale; legs and venter pale. Duration of this period four days.

After 2nd moult.—Length .25 inch. Much as in the preceding period; mostly lead colour on the back; dorsal line blackish with a whitish line each side of it; subdorsal line yellow, somewhat orange where the orange blotches were before, and paler between, but this time a continuous line; below this a whitish line and still lower two pale yellow lines, the separating lead line wider than the yellow, the lead line containing the stigmata; the ground colour on the sides almost black. There are four tubercles to each

joint; those on joint 2 all prominent and pointing forward; the dorsals on joints 3 and 4 a little less prominent, those on 5 to 11 small, those on 12 and 13 about the same as those on 3 and 4; lateral tubercles just above the legs, large, long and pointing outward and downward giving the body a flattened appearance; hairs on the dorsum not very long, the clusters moderate as to l[illegible]ior and lateral full and long; all grey. Head black. L[illegible]eriod seven days.

After 3rd moult.—Leng[illegible]larked as before but the body more a series of alternate li[illegible]ale lines more a clear yellow the black lines where wide [illegible]th yellow; a whitish patch on the posterior part of the dor[illegible]and the anterior part of 5, and the same on joints 8 and 9, the [illegible]almond-shaped than the first; tubercles, larger; head and ven[illegible]ack. Duration of this period thirteen days.

After 4th moult.—Length .85 inch. General appearance as before, the yellow mottlings in the black more prominent and the light lines less conspicuous; the lateral hairs white, the tufts full and the hairs long; the dorsal tufts short and spreading; the tubercles lead-black. Duration, of this period fourteen days.

After 5th moult.—Length 1.40 inches. The general colour grey, composed of a great number of fine alternate longitudinal light and dark grey lines, giving a paler shade than during the preceding period; a deep black transverse stripe back of joint 4, shaded each side with dark grey, the black not always showing on account of being more or less covered by the inter-segmental folds; the dorsal tubercles on joint 4 large, buff, studded with short black spines; all the other dorsal tubercles small and hairy, with only about six short black spines to each; the lateral tubercles large, extending outward, from the upper part of the outer end of the tubercles about twelve black bristles or hairs as long as the body is wide; below these are finer white hairs many of which are longer than the black ones; mingled with these white hairs are about a dozen that are tipped with triangular fan-shaped tips resembling somewhat the tips on the tail feathers of the peacock; under parts orange with a round black patch on each joint.

Mature Larva.—Length 2.25 inches. The markings and characters are as at the beginning of this period. Duration of this period from twenty-four to fifty-six days.

Cocoon.—Outline elliptical, fastened to the flat side of the box; 1.50 inches long by .70 inch wide and .30 inch high or deep, a thin film of silk next to the board between the pupa and the upper side of the cocoon that extends out beyond the cocoon as though the larva had first covered an area of the board before forming the other part of the cocoon; the outer part compact except next to the head where it is less so, as though preparing a place to emerge; the hairs of the body woven into the cocoon with the silk; smooth inside; the pupa not attached. Colour light grey, yellowish white inside. The larva makes the cocoon by beginning at one end and working towards the other, and after completion loosely fastening the entrance.

Chrysalis.—Length 1.05 inch, width of joint 5 .40 inch, depth .30 inch, length to the posterior part of the wing cases .55 inch, these extending to the middle of joint 5; length of tongue case .40 inch. The shape is oblong, flattened, ventral side more so than the dorsal, rounded about equally at both ends, no hooks or cremaster at the anal end but six pointed elevations that are not prominent, a dorsal ridge or pronotum. Colour chestnut-brown, dorsal line darker, head pale, anterior part almost greenish-white. Duration of this period about fifty-five days.

There is only one brood in a season, the aggregate of the figures given in the periods of duration of the different stages amounting to 347 days. The eggs from which these notes were taken were sent me by my friend Mr. James Angus, of West Farms, N. Y. The letter accompanying them stated that the eggs were deposited the latter part of September, 1888. There were two masses of them, in elongate strings, not quite straight, one on a leaf and the other on a twig of apple. The mass on the leaf was about 1.15 inches long, the other was about .80 inch. Each string was a single row of eggs; each egg covered over with black hairs from the abdomen of the mother moth. They were placed obliquely on their sides in the string.

During the first part of their larval period they eat about as voraciously and grow as rapidly as most moth larvæ, but after the last moult they feed but little from day to day, the most of the time lying stretched out at full length on a twig or on the side or top of the box. With the rather flat body, made to appear much more so by the lateral tubercles and their tufts of spreading hairs, they simulate perfectly a slight enlargement in an apple twig or small limb.

ON THE FOOD-HABITS OF NORTH AMERICAN RHYNCHOPHORA.

BY WM. BEUTENMULLER, NEW YORK.

(Continued from page 203.)

Orchestes niger and [illegible] both found on willow when in bloom. (Harrington Ca[illegible].)

Orchestes niger and *O.* [illegible] taken together in July on the leaves of low willows by [illegible] *O. ephippiatus* was found in abundance on willow (*Salix* [illegible]) Mr. C. W. Leng and myself on Staten Island, N. Y.

Miarus hispidulus has been obs[illegible]o breed in the seed capsules of *Lobelia inflata.* Blanchard (Ent. A[illegible] p 87).

Cionus scrophulariæ attacks the [illegible] of the plum, feeding in the kernel. The first mention and figure was given by De Geer in 1775 (Mem. V). In Europe it is found on *Scrophularia* and *Verbascum.*

Gymnetron teter may be found in abundance on the stalk of mullen *(Verbascum Thapsus.)* The larva lives in the seed pods.

Rhyssematus lineaticollis may be found infesting the seed pods of milkweed *(Asclepias.)*

Tyloderma fragrariæ lives in the strawberry, excavating the crown and roots of the plant. (Riley.)

Tyloderma faveolatum bores in the stems of evening primrose *(Œnothera biennis).* Also bred from *Epilobium* by Dr. C. M. Weed.

Cryptorhynchus lapathi bores in the stems of willow and alder.

Cryptorhynchus bisignatus was found by Dr. Packard on the leaves of oak. Several specimens were taken by Mr. F. H. Chittenden in the latter part of May at Clifton, N. J., on a chestnut log infested with *Leptostylus macula,* and during the last part of June fifteen or sixteen examples were found on another log of chestnut, some of them copulating; also taken on the trunk of a living birch tree infested with Scolytids.

Cryptorhynchus parochus lives under the bark of butternut. (Schaupp, Bull. Bklyn. Ent. Soc., IV., p. 35.)

Pseudomus truncatus is found on dead limbs of old butternut trees, according to Mr. Harrington. (CAN. ENT., 16, p. 118.)

Conotrachelus naso has been bred from the fruit of hawthorn *(Cratægus)* by Dr. Hamilton. (CAN. ENT., 21, p. 34.) *C. cratægi* also lives in the fruit of the *Cratægus* as well as that of the plum.

Conotrachelus nenuphar is destructive to the apple, apricot, cherry, peach, pear and quince, feeding in the fruit. *C. juglandis* inhabits walnuts.

Conotrachelus anaglypticus, according to Say, breeds in the fruit of the walnut *(Juglans)*. *C. elegans* was obtained by Say on *Pinus rigida*. (Leconte Ed. I., p. 283.)

Craponius inæqualis is destructive to the grape, stinging the fruit and sometimes destroying the whole bunch.

Rhinoncus pyrrhopus. A pair of these little beetles were taken by Mr. F. H. Chittenden *in coitu* on a common species of dock *(Rumex* sp.), and being confined in a small vial with a part of a dock leaf consumed it almost entirely within a week. The species has also been observed by Mr. M. L. Linell on a species of *Rumex*. June.

Cœliodes flavicaudis, according to Mr. Chittenden, occurs in great abundance on the common nettle *(Urtica dioica)* in May, June and July.

C. acephalus is abundant along the coast of New Jersey on the evening primrose *(Œnothera biennis)*. June, July and August.

Acoptus suturalis Lec. lives in the dead wood of beech trees. Mr. F. H. Chittenden has found the imagines in the wood March 27th to April 20th in company with larvæ apparently of the same species. One of these larvæ taken May 26th appeared about to pupate. The beetles were crawling on the trunk of the tree early in July.

Mononychus vulpeculus infests the seed pods of the blue-flag *(Iris)*. It also occurs on the flowers of *Ceanothus americanus* and *Verbascum thapsus*. (Say, Vol. I. Lec. Ed., p. 286.)

Ceutorhynchus cyanipennis. According to Mr. Jülich this insect is said to be found on grass (Ent. Am., 5, p. 57). In Europe it lives in the roots of cabbage.

Ceutorhynchus assimilis occurs on the radish and *C. rapæ* infests the rape, and *C. septentrionalis* is found on mustard *(Sisymbrium officinale)*.

Trichobaris trinotata bores in the stalk of the potato, causing the stem to wilt.

Ampeloglypter sesostris makes a gall on the grape vine, as also does *A ater*. (Riley, Bull. Bklyn. Ent. Soc., VI., p. 61.)

Centrinus scutellum-album I found on the flower heads of the daisy.

Balaninus quercus, *B. nasicus*, *B. uniformis* were bred from different kinds of acorns. *B. obtusus* inhabits hazel nuts. *B. caryæ* lives in hickory nuts. *B. proboscideus* [illegible] re bred from chestnuts. The latter also inhabits acorn[illegible] AN. ENT., 22, p. 1–6).

Cylas formicarius bore[illegible] f the sweet potato in Florida. (Comstock Rep. Dept. Ag[illegible] 879.)

Eupsalis minuta bores un[illegible] of oak, chestnut and maple.

Rhynchophorus cruentatus lives in [illegible]e lower parts of the trunk and roots of the palmetto. I have t[illegible]ut one hundred individuals at Enterprise, Florida, in May. The [illegible]ens were caught boring in the soft pulpy substance in the trunk of a [illegible]oung and freshly cut palmetto tree. *R. palmarum* also lives in the palmetto.

Rhodobænus 13-punctatus I found on evening primrose *(Œnothera)*. Probably lives in its larval stage also upon the plant. It also infests the stems of *Ambrosia*, *Xanthium strumarium* and thistle.

Cactophagus validus has been found exclusively under decaying *Opuntia* leaves, the larva no doubt living within the leaves or roots of the same plant. (Insect Life, I., p. 199.)

The genus *Sphenophorus* infests roots or lower parts of the stems of various wild or cultivated *Graminaceous* plants (l. c.). *S. parvulus* lives in the roots of meadow grass *(Timothy)*, and *S. robustus* in the roots of maize or corn, and *S. ochreus* in the roots of *Scirpus atrovirens*.

Calandra granaria and *C. oryzæ*. Both these species depredate upon stored wheat, corn, rice and and other grains.

The genera *Yuccaborus* and *Scyphophorus* infest plants of the genus *Yucca* (l. c., p. 199).

The genera *Dryotribus*, *Gononotus*, *Macrancylus*, *Mesites(?)*, *Elassoptes* are strictly maritime, and live in larva and imago states in old boards and roots, etc., washed up on the beach. (l. c., p. 198).

Cossonus corticola I found in abundance under the bark of dead pine trees. At Enterprise, Florida, *C. piniphilus*, *C. concinnus* and *C. crenatus* also live under pine bark. (Ricksecker, Ent. Am., I., p. 96).

Cossonus platalea has been found by Mr. Harrington in numbers under the bark of a partly decayed poplar tree. (Ent. Am., p. 19).

The genera *Allomimus*, *Caulophilus*, *Amaurorhinus*, *Rhyncolus* and *Stenoscelis* live under bark of dead and decaying wood or bore into decaying wood of deciduous or coniferous trees. (Insect Life, I., p. 198).

Dryophthorus corticalis was found under dead pine bark *(Pinus rigida)* by Mr. J. Sherman.

Wollastonia quercicola lives in decaying wood of cottonwood. (Knaus, Bull. Bklyn. Ent. Soc., VII., p. 150).

Himatium errans is inquilinous in the galleries of *Tomicus cacographus* under bark of yellow pine. (Schwarz, l. c.) *H. conicum* has been found breeding under the bark of Tulip-tree, also taken under pine bark by Mr. Chittenden.

Phlœophagus apionides lives in the trunks of wild cherry *(Prunus serotina)* and ash. *P. minor* was found on birch, willow and elm by Mr. F. H. Chittenden; also taken on ash by Mr. Jülich, who found the European *P. spadix* in water-soaked drift wood at the sea shore of Long Island.

Stenoscelis brevis has been taken from old maple and poplar stumps by Mr. Harrington (Ent. Am., I., p. 19); also found on linden, beech, birch, butternut, sycamore and willow by Mr. Chittenden.

Rhyncholus brunneus has been found in wood of *Prunus serotina* by Mr. F. H. Chittenden.

Choragus Sayi was found by Mr. Schwarz in the twigs of dead beech trees which were injured by fungus.

Cratoparis lunatus lives in fungus found on dead oak trees.

Brachytarsus limbatus was raised by Mr. Schwarz from the flower heads of *Helenium tenuifolium*.

B. variegatus breeds in the smut of corn. (Schwarz.)

B. tomentosus was found on rag weed by Dr. Hamilton. (CAN. ENT., 18, p. 114). Also taken on the same plant by Mr. J. Sherman.

Euxenus piceus was found on dry palmetto leaves in Florida by Mr. Schwarz (l. c., p. 85).

NOTE.—I should be pleased to hear from anyone that may be able to inform me of any Food-Habits of North American Rhynchophora not mentioned in the forgoing paper, so that I can notice the same in an appendix which will shortly ap ar.—W. B.

BOOK NOTICES.

MANUAL OF INJURIOUS INSECTS, AND METHODS OF PREVENTION: By Eleanor A. Ormerod. (Second Edition.)

A greatly enlarged and revised edition of Miss Ormerod's excellent manual has just appeared. There is so much that is new in it that it can hardly be considered the s stated by the editors of *Insect Life*:—"On account of its admirable arrangement, plain language, and abundant illu ost a model of what such a work should be." These m ntelligible, and, indeed, indispensable to every farmer, gar rower who wishes to carry on his work in the most successfu he different kinds of attacks are arranged alphabetically un ee headings of Food Crops, Forest Trees, and Fruit. At th lphabetical list of the insects mentioned, and as an appendix an introduction to Entomology, specially prepared for farmers and others who have no knowledge of the science, in such a way as to enable "the observer of crop attack to tell at least what kind of an insect is before him." This i llowed by a glossary of entomological terms, and a full index. The whole forms a most readable, valuable and reliable work of 410 pages, copiously illustrated with 155 excellent figures.

A noticeable feature is the adoption of the use of the arsenites in the warfare against insects, which has only very recently found favour in England; this Miss Ormerod boldly and wisely advocates.

The advance made during the last decade in the science of reducing the injury to crops by insects, is in a large measure due to the talented authoress of the above work, which, we think, cannot be too highly praised.

J. F.

BUTTERFLIES OF NORTH AMERICA, Third Series, Part X.: By W. H. Edwards.

The last part of Mr. Edwards's superb work has just come to hand. It is of exceptional beauty and interest. Plate I. illustrates the complete life-history of *Argynnis Alcestis*. Plate II. *A. Adiante*, ♂ ♀, and *A. Atossa*, ♂ ♀ (n. s.). Plate III. *Satyrodes Canthus*. Complete life-history. The letter-press is very full. The two first-named species have a peculiar interest since the appearance of Mr. H. J. Elwes's "Revision of the Genus Argynnis," and Mr. Edwards's "Notes" thereon. (CAN. ENT., Vol. XXII, p 82.). *A. Alcestis* is shown to be distinct from *A. Aphrodite* in all its stages. *A. Adiante*, ♂ is figured from Dr. Boisduval's actual type. Most Lepidopterists will, I think, agree with Mr. Edwards, that this is a good species and quite distinct from *A. Zerene* or *A. Monticola*.

J. FLETCHER.

Mailed December 3rd.

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CORRECTION.—Through a clerical error I have given, on page 189, line 23, *Carabus baccivorus* Fisch. as a var. of *chamissonis* Fisch., instead of a var. of *tædatus* Fab. W. H. HARRINGTON.

THE CANADIAN

ENTOMOLOGIST.

VOLUME XXIII.

a

EDITED BY THE

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J. Fletcher, Ottawa; H. H. Lyman, Montreal, and Rev. T. W. Fyles, Quebec.

London, Ont.:

LONDON PRINTING AND LITHOGRAPHING CO.

1891.

LIST OF CONTRIBUTORS TO THIS VOLUME.

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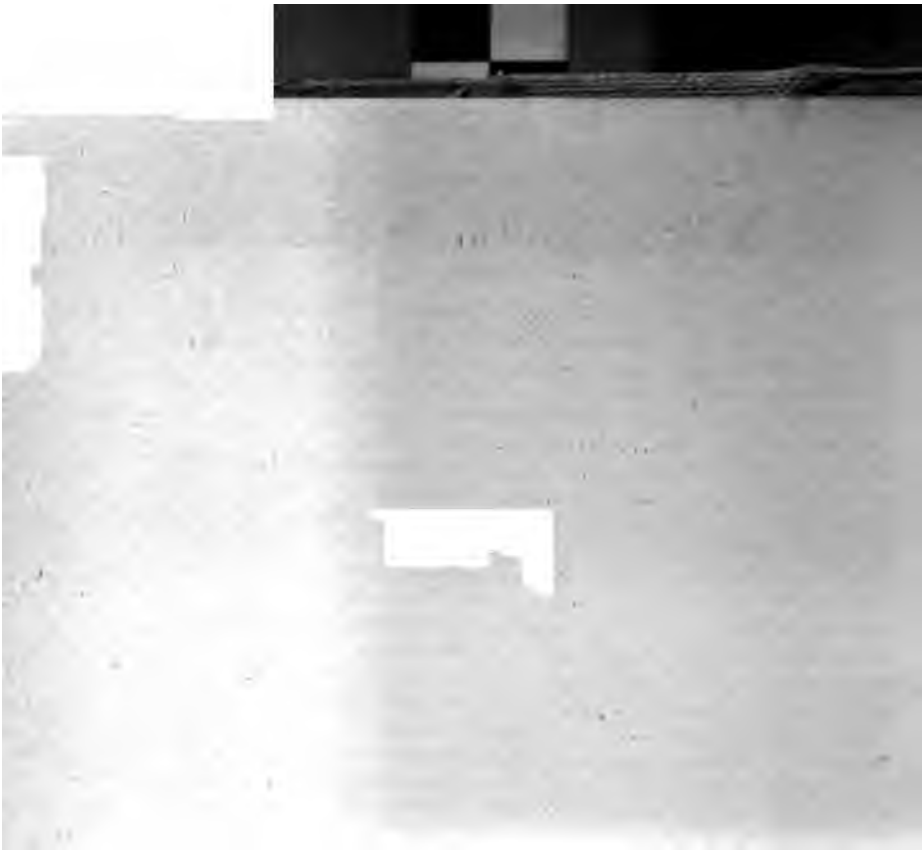

The Canadian Entomologist.

VOL XXIII. LONDON, JANUARY, 1891. No. 1.

DESCRIPTIONS OF SOME NEW CANADIAN BRACONIDÆ.

BY WM. H. ASHMEAD, BERLIN, PRUSSIA.

The interesting new species of Braconidæ described below, unless otherwise stated, were all captured by my good friend Mr. W. Hague Harrington, at Ottawa, Canada.

BRACON FABR.

(1) *Bracon brachyurus* n. sp.

♀.—Length $2\frac{4}{5}$ mm.; ovip. $\frac{1}{3}$ mm. Black, polished; mandibles, palpi and legs, except the posterior coxæ and the basal two-thirds of their femora, yellowish-brown. Tegulæ honey-yellow. The head is transverse, the cheeks rounded off posteriorly. Antennæ 22-jointed. The parapsides are not sharply defined, only indicated by slight depressions in the mesonotal surface. Metathorax finely rugose with a delicate median keel. Abdomen oval, depressed, the 1st and 2nd segments wrinkled or slightly rugose, the segments beyond smooth, shining, and all of nearly an equal length. Wings hyaline, the venation brown; the recurrent nervure is not interstitial with the 1st transverse cubital, and the 2nd branch of the radius is about twice the length of the 1st.

Described from a single specimen.

(2) *Bracon melanaspis* n. sp.

♀.—Length $2\frac{3}{5}$ mm.; ovip. $\frac{3}{5}$ m.m. Black, polished; mandibles, palpi and legs, except the posterior pair which are entirely black except the apex of the femora, and extreme apex of abdomen, brownish-yellow. The wide lateral membranous portion of 1st abdominal segment, pale yellow. The head as in the previous species. Antennæ very long 28-jointed. Tegulæ black. Parapsidal grooves not sharply defined, and fringed with long hairs. The scutellum is also sparsely pubescent. Metathorax and pleuræ smooth, shining. Abdomen oval, the 1st segment with a smooth, black shield, the sides of which are parallel and the disk

with a slight elevation. Wings greyish-hyaline, due to the pubescence, venation brown, the 1st branch of the radius more than half as long as the 2nd, the recurrent nervure not interstitial with the 1st transverse cubital.

Described from one specimen.

(3) *Bracon nigridorsu*

♀.—Length $3\frac{1}{5}$ mm.; Black, polished; mandibles, palpi, legs, including coxæ, n, except the disk of 1st, 2nd, 3rd, 4th and 5th segments, w , wholly pale brownish-yellow. Tegulæ honey-yellow. Ante l. Parapsides distinct. Metathorax and mesopleuræ sm he latter with a single fovea near the posterior suture. l y hairy. Abdomen long oval, the shield of the 1st segment t finely rugose, rounded off at apex and between it and the l s of the segment are two long channels; the 2nd segment is slightly st eened at base. Wings hyaline, strongly iridescent, the venation brown; the 2nd branch of the radius is twice the length of the 1st, the recurrent nervure not interstitial.

SPATHIUS NEES.

(4) *Spathius Canadensis* n. sp.

♀.—Length $2\frac{4}{5}$ mm.; ovip. $1\frac{2}{5}$ mm. Reddish-brown, the dorsum of thorax blackish or dark fuscous, the abdomen, except the long petiole and the base of the 2nd segment, black. The antennæ are honey-yellow, very long, multiarticulate, the posterior femora and tibiæ slightly fuscous. Head perfectly smooth, polished; the thorax delicately shagreened, the parapsidal grooves very distinct, deep; the metathorax with 3 or 4 delicate longitudinal carinæ. Wings fuscous, the base and tips hyaline and with a white or hyaline band across the middle, including the basal half of the stigma.

Described from one specimen. The species comes nearest to *L. Laflammei* Prov., but is readily separated from it and other species by its smaller size, perfectly smooth head and by the brevity of the ovipositor.

CÆNOPHANES FÖRSTER.

(5) *Cænophanes borealis* n. sp.

♀.—Length $3\frac{3}{5}$ mm.; ovip. $\frac{4}{5}$ mm. Very elongate, black, finely rugose; the quadrate head is smooth, but with delicate transverse aciculations on

the vertex; the apical portion of 3, 4 and 5 abdominal segments, two-thirds of the 6th and the 7th wholly smooth and polished. Antennæ honey-yellow, long and slender. Legs brownish-yellow, the posterior coxæ black, the anterior and middle pairs more or less dusky basally. Parapsidal grooves distinct, the middle lobe with a median longitudinal furrow. Wings hyaline, the venation as usual, the 1st transverse cubital vein obliterated.

Described from one specimen.

RHOGAS NEES.

(6) *Rhogas mellipes* n. sp.

♂.—Length 3½ mm. Black; Antennæ 29-jointed, brown; mandibles, palpi and apical abdominal segment white; legs, including coxæ uniformly pale honey-yellow. Head smooth, polished, the face with some sparse hairs. Thorax with parapsides distinct, the three lobes, except the middle lobe posteriorly just in front of the scutellum where it is coarsely rugose, are smooth and polished. Scutellum rufous. The upper portion of the mesopleuræ and the metathorax coarsely rugose. Abdomen, except the three basal segments which are coarsely longitudinally striated, smooth, shining; the apical edge of the 3rd segment is tinged with rufous. Wings hyaline, the venation pale brown; the second branch of the radius is only slightly longer than the 1st.

Described from one specimen.

MICROPLITIS FÖRSTER.

(7) *Microplitis cincta* n. sp.

♂.—Length 3⅝ mm. Black, opaque, rugoso-punctate, and with a sparse, short pubescence; the palpi, legs, the membranous portion of the 1st, and 2nd and 3rd abdominal segments reddish-yellow; the posterior coxæ basally, a small spot at extreme tips of their femora and tarsi fuscous; the apical joints of antennæ and the middle tarsi are also fuscous. Antennæ 18-jointed, black, except as mentioned, longer than the body, the 1st two joints of flagellum of about an equal length, and slightly longer than the joints beyond. Parapsides indicated slightly posteriorly. Mesopleuræ with an oblique groove on the disk. Metathorax coarsely rugose without carinæ, except two slight ones laterally extending in the form of an indistinct channel from the rounded spiracles. Abdomen

oval, depressed, smooth and shining; the shield of the 1st segment linear, and with the posterior corners rounded off. Wings hyaline, the stigma and most of the costæ, brown-black, the other veins brown; areolet large, closed.

Described from one specimen.

This species comes nearest to *M. mamestræ* Weed.

(8) *Opius Canadensis* n

♂.—Length $2\frac{2}{5}$ mm. d; the orbits broadly, the face wholly, the scape and two of u flagellar joints beneath, legs, including coxæ, the lateral or memb portion of 1st and 2nd abdominal segments, and the s the 2nd and 3rd, all honey-yellow; the posterior tibia d their tarsi slightly dusky. Antennæ as long as the bo brown. Wings hyaline, the venation brown, the recurrent nervure nost interstitial with the first transverse cubital, the median and submedian cells of an equal length. Metathorax smooth, with some sparse, long bristles scattered over its surface. The shield of the 1st abdominal segment is longer than wide, smooth, the disk impressed, the sides parallel; the 2nd and 3rd segments are slightly rugose, the following smooth, shining, sparsely hairy.

Described from one specimen.

(9) *Opius bicarinatus* n. sp.

♂.—Length $3\frac{2}{5}$ mm. Robust, black, shining and pubescent. Head broad, rugosely punctate; face with glittering pile; palpi and legs pale rufous, the posterior coxæ black. The thorax has the parapsidal grooves coarsely indicated and punctured at bottom, across the base of the scutellum is a deep broad fovea, while the pleuræ are rugoso-punctate. The metathorax is finely rugose, and there is a large fovea on each side of the post scutellum. Abdomen oval, depressed, rufous, the base and apex black; the 1st segment is the longest with two carinæ on the disk and rugose, the 2nd segment is also rugose, while the following segments are smooth and covered with fine hairs. Wings hyaline, the venation dark brown; the 2nd submarginal cell is much narrowed at apex, from an exceedingly short 2nd transverse cubital nervure, and this will be found to be a good character to distinguish the species.

Described from one specimen.

IDIASTA FÖRSTER.

(10) *Idiasta macrocera* n. sp.

♂.—Length 3⅝ mm. Black, highly polished, the second abdominal segment with a rufous stain. Antennæ 40-jointed, nearly twice as long as the body, brown, the scape and 2nd joint red, the 4th about one-third longer than the 3rd. Palpi pale; mandibles and legs red. Thorax with the parapsidal grooves indicated only anteriorly by short, punctate lines, a grooved line on the shoulders and a fovea just in front of the scutellum. The scutellum has at base two large foveæ separated by a slight carina. Mesopleuræ smooth, with a broad punctate space between them and the mesopectus. Metathorax coarsely rugose. Abdomen ovate, and excepting the petiole, which is longitudinally striated, smooth and polished. Wings hyaline, the stigma very large, ovate, brown, the veins paler.

Described from one specimen.

APHIDIUS NEES.

(11) *Aphidius macrogaster.* n. sp.

♂.—Length 3½ mm. Head, thorax and legs rufous; the anterior legs slightly yellowish. The abdomen is very long, lanceolate, slightly more than twice the length of the head and thorax combined, terminating in a small curved prong. Antennæ 20-jointed, brown, the joints of the flagellum about twice as long as thick. The mesonotum exhibits some fine longitudinal aciculations just in front of the scutellum and the parapsidal grooves are present, otherwise it is smooth and shining. Wings hyaline, the venation brown; the 2nd branch of the radius is about as long as the transverse cubital nervure.

Described from one specimen.

The species approaches nearest to *A. bicolor* Ashm.; but that species is larger, the head black, and the sculpture of the mesonotum is different.

(12) *Aphidius crassicornis* n. sp.

♂.—Length 2⅘ mm. Black polished; clypeus piceous; mandibles, palpi, two basal antennal joints and legs, yellow, the middle and posterior tibiæ and tarsi sightly obfuscated. Antennæ 21-jointed, stouter than usual and remarkable for the shortness of the flagellar joints, which are hardly longer than wide and readily separate the species from all other described forms. The abdomen, except a rufous tinge on the 2nd seg-

ment, is black, smooth, the petiole being slightly roughened and about twice as long as wide. Wings hyaline, the venation brown.

Described from one specimen. A ♀ named in ms. *A. brevicornis*, but which I now believe to be the opposite sex of the above species, agrees with it in colour, but has unusually short, 16-jointed antennæ that do not extend beyond the apex of the metathorax, and while the flagellar joints are also short, they are y[illegible]r than wide.

The opportunity is tak[illegible]ribe three other species in this genus, which have been lo[illegible]ion, as follows :—

(13) *Aphidius pinaphi*

♂ ♀.—Length 2⅔ to 3 m[illegible]-yellow; in the ♂ the occiput, disks of metathorax and abd[illegible] or blackish; in the ♀ only the abdomen shows a dark blotch or [illegible]ove toward the tip, otherwise it is wholly brownish-yellow. The [illegible]næ are 25-jointed, the ♀ 16-jointed, and in both sexes the f[illegible] black, the joints being longer than wide, while the mesonotu[illegible]ctly punctate. Wings hyaline, venation as usual brown.

Hab.—Jacksonville, Fla.

Described from several specimens reared by me many years ago from the pine aphis *Lachnus Australis*.

(14) *Aphidius bifasciatus* n. sp.

♀.—Length 2⅘ mm. Brownish-yellow; the abdomen and flagellum black, the petiole yellowish.

This species has 20-jointed antennæ, a peculiar shagreened punctuation, no parapsidal grooves, two transverse brown bands on the anterior wings, and thickened or swollen posterior femora.

Hab.—Jacksonville, Fla.

Described from a single specimen reared from the pine aphis. The banded front wings and the swollen posterior thighs readily distinguish the species.

(15) *Aphidius nigriceps* n. sp.

♂.—Length 2⅔ to 2⅘ mm. Bright yellow testaceous, smooth and polished; the head above and the disk of the mesonotum black. Sometimes the disk of two or three of the abdominal segments also show dusky blotches or shades. The antennæ are 21 or 22-jointed, very long, black, except the two basal joints; the flagellar joints are about twice as long as

thick and delicately fluted. The mesonotal grooves are wanting. Metathorax areolated. The abdominal petiole is about two and a-half times as long as wide, finely rugose and with a slight constriction at about the middle above. The middle and posterior tarsi are slightly dusky. Wings hyaline, the venation pale, the 2nd branch of the radius longer than the transverse cubital nervure.

Described from two specimens taken by Mr. E. A. Schwarz, at Oakland, Md.

LIPOLEXIS FÖRSTER.

(16) *Lipolexis fuscicornis* n. sp.

♀.—Length 1⅝ mm. Black, polished; mandibles, palpi, two basal joints of antennæ base of third, legs and petiole flavo-testaceous, the 2nd abdominal segment piceous. Face scaly. Antennæ 12-jointed, the flagellum slightly thickened toward tip, fuscous, the joints twice as long as thick. Wings hyaline, the venation brown, the radius unusually long and almost forming a closed radial cell.

Taken at Ottawa. This is the only species to be described in this genus with 12-jointed antennæ, and this character, with the long radial vein, will readily distinguish it from the several other species now placed here.

HISTEROMERUS WESMAEL.

(17) *Histeromerus Canadensis* n. sp.

♀.—Length 2⅛ mm.; ovip. ⅜ mm. Black, polished; collar and prosternum flavo-testaceous; legs yellowish-red. The oblong head is a little longer than wide, a little wider behind than in front, smooth and polished, except some punctures above the clypeus. Antennæ 15-jointed, and when extended backward extend only to the tegulæ. The dorsum of thorax is flattened, the parapsidal grooves indicated only anteriorly by some punctures. The abdomen is as long as the head and thorax together, compressed, black, the sutures of the ventral segments tinged with yellow. Wings subhyaline, somewhat narrowed, the veins brown; the 2nd submarginal cell is long and rather narrow, about one-third longer than the 3rd; the recurrent nervure enters the 2nd submarginal cell at its lower posterior angle.

Described from a single specimen. Its smaller size, colour and the paucity of joints in the antennæ, will at once separate it from *H. mystacinus* Wesmael.

NOTE ON THE OCCURRENCE OF LEPISESIA FLAVO-FASCIATA, BARNSTON.

BY H. H. LYMAN, MONTREAL.

Having been asked by Sir William Dawson to look over two collections of insects which ha[illegible] competition for a prize, I was delighted to find in one o[illegible] n of this very rare moth.

Knowing that everythi[illegible] n with the capture of such a rarity would be of interest [illegible] lliam to ascertain from Mr. R. McDougall, the collector, a[illegible] he could furnish in connection with such an interesting eve[illegible] received, through Sir William, a letter about it, from which I ext[illegible] following account :—

"The moth was caught at [illegible] Chateauguay County, and was the only one observed during t[illegible] If I remember aright, it was captured on the wing, about three o'clock one bright sunny afternoon. It was hovering over a garden, where many kinds of flowers were growing side by side. The capture was made, I believe, about the middle of June."

This species has been taken sparingly at widely separated localities. It was described by Barnston from a specimen taken at St. Martin's Falls, on the Albany River, Hudson's Bay Territory. Grote and Robinson gave its habitat as the Atlantic district. Strecker figured it on Plate XIII., fig. 4, of his "Lepidoptera," but in nature the yellow of the hind wings is brighter, and with a good deal more orange in it than would be supposed from Strecker's figure. Strecker gave the localities as Canada; Holyoke, Mass.

Prof. Fernald says of this species :—"The early stages and food plant of this exceedingly rare moth are unknown. It has been taken in Canada, Massachusetts, Belfast and Orono, Maine. Mr. Thaxter informs me that he saw one at Kittery, Maine, flying around the flowers of Larkspur in June. It flies in the middle of the day in the hot sunshine around the flowers of apple, lilac, shad-bush, etc. It appears to be one of our earliest day-flying sphinx moths."

THE HABITS OF A GROUND-HORNET.

BY WM. T. DAVIS, TOMPKINSVILLE, STATEN ISLAND, N. Y.

Stizus speciosus is the largest native ground-hornet, and its formidable appearance and great activity generally secure it undisputed possession of the square rod where it happens to alight. It is from an inch to an inch and one-half in length; the head and thorax are brown, and the abdomen is black with six irregular yellow blotches. These markings are discernible as it flies swiftly about its business, and give it a particularly tiger-like appearance. It seems to be afraid of nothing, and if you walk near its burrow it flies with a menacing buzz in circles about you, and its brown, black and yellow body gleams in the sunlight.

In constructing its burrows, it usually selects a country roadside or a dry, barren hill, where a freedom from roots makes digging less laborious.

On the hill back of Richmond village, on Staten Island, I have seen them carrying heavy harvest-flies to these burrows, several of which are dug there nearly every summer. The task of carrying so great a burden as a *Cicada* is a particularly laborious one, and they do not fly very fast when thus heavily laden. Sometimes they drag the harvest-flies a distance along the ground, and sometimes they resort to an ingenious method to finally get them to their burrows.

In August, 1889, I observed a *Stizus* carrying a *Cicada*, and flying slowly up a hillside. It lit at the base of a black birch on the hill-top, and dragged the harvest-fly, holding the smooth dorsal surface to the bark, to the topmost branches, finally disappearing among the leaves. I did not see it leave the tree, for I was unable to command a view on all sides at the same time, and then there was a neighboring birch whose branches interlocked with the one where the hornet was. I satisfied myself that it did leave, by climbing up and violently shaking the branches and tree top. *Stizus* employs this method of transporting the heavy *Cicada;* it climbs the tree with the insect, and then flies from the branches, the excessive weight gradually bringing it to the ground again, but nearer to its burrow.

Professor Morse, in his annual address before the American Association in 1887, notices the following:—"Dr. Thomas Meehan describes a hornet that was gifted with great intelligence. He saw this insect struggling with a large locust in unsuccessful attemps to fly away with it. After several fruitless efforts to fly up from the ground with his victim, he

finally dragged it fully thirty feet to a tree, to the top of which he laboriously ascended, still clinging to his burden, and having attained this elevated position he flew off in a horizontal direction with the locust."

Commenting upon this, Mr. C. G. Rockwood, jr., in Science for August 19th, 1887, gives an account of "a large insect evidently of the wasp family," that carried [illegible] distance of twenty feet up a maple tree and then flew a [illegible] escribed above.

Wishing to ascertain the [illegible]s of these insects, I had dried specimens, including pins, w[illegible]uggist's scales. *Cicada tibicen* weighed thirteen grains and [illegible]s seven and one-half.

LIST OF LEPIDOPTERA T[illegible]N AT LITTLE METIS (RIMOUSKI Co., P. QUE.

BY ALBERT F. WINN, MONTREAL.

My collecting at Little Metis having been confined to July and August, my knowledge of the forms occurring there is necessarily very incomplete; but as the insect fauna of the Lower St. Lawrence seems to differ considerably from that of Ontario and the western part of Quebec, I venture to give a list of the species I know to occur there, and hope that in the event of my not going there again, some other entomologist will give us a list of additions.

1. *Papilo turnus* Linn. Common inland; rarer on the shore; July.
2. " *asterias* Fabr. Rare; July; larva in August.
3. *Pieris oleracea* Bd. Very common; July and August.
4. " *rapæ* Linn. Very common; July and August.
5. *Colias philodice* Godt. Very common; July and August; Albino females sometimes as common as yellow ones, though not usually.
6. *Danais archippus* Fabr. Very rare; 1 specimen, August.
7. *Argynnis cybele* Fabr. Females common; July; no ♂'s seen.
8. " *atlantis* Edw. Very common; July and August.
9. " *myrina* Cram. Rare; July (commoner, no doubt, in June.)
10. " *bellona* Fabr. Very rare; July, in a swampy field.

11. *Phyciodes tharos* Drury. Common; July.
12. *Grapta faunus* Edw. Rare; August.
13. " *gracilis* G. & R. Common; August, but hard to catch.
14. " *progne* Cram. Very rare; 1 specimen, Aug. 18th.
15. " *J-album* Bd. Very rare; 1 specimen, Aug. 12th.
16. *Vanessa antiopa* Linn. Common; August; larvæ on poplar, July.
17. " *Milberti* Godt. Very rare; 1 specimen, August.
18. *Pyrameis atalanta* Linn. Very rare; August.
19. " *huntera* Dru. Rather common; August.
20. " *cardui* Linn. Abundant in 1884 and 1889; none seen other years.
21. *Limenitis arthemis* Dru. Local, but common where found; July.
22. " *disippus* Godt. Rare; July.
23. *Satyrus alope*, dim *nephele* Kirby. Very rare; 1 specimen (♂), August, 1884.
24. *Chrysophanus americana* D'Urban. Abundant; July and August.
25. *Lycæna Couperi* Grt. Very rare; 2 specimens, July 8th and Aug. 18th.
26. *Pamphila Peckius* Kirby. Common; July.
27. " *manitoba* Scud. Common; end of July and August; very fond of buttercup flowers.

ZYGÆNIDÆ.

28. *Ctenucha virginica* Charp. Local, but abundant in places; July.

BOMBYCIDÆ.

29. *Deiopeia bella* Linn. Very rare; 1 specimen, August.
30. *Arctia virgo* Linn. Rather common at light; July.
31. " *Saundersii* Grt. Common; July and August; light.
32. *Spilosoma virginica* Fabr.
33. *Leucarctia acræa* Pack.
34. *Halesidota caryæ* Harr.
35. " *maculata* Harr.

Larvæ common in August; moths, probably about in June.

36. *Orgyia nova* Fitch. Common; August.
37. " *leucostigma* A. & S. Rare; August.
38. *Ichthyura albosigma* Fabr. Rare; July, 1 specimen; light.
39. *Pheosia rimosa* Pack. Rare; July; light.
40. *Clisiocampa americana* Harr. Rare; July, 1 specimen.
41. *Hepialus 4-guttatus* Pack. Very rare; August; light.

NOCTUIDÆ.

42. *Gonophora scripta* Gosse. Rare ; July and August.
43. *Raphia frater* Grt. Rare ; July.
44. *Bryophila lepidula* Grt. Rare ; July and August.
45. *Microcœlia fragilis* Guen. Common ; July.
46. *Agrotis baja* S. [illegible]
47. " *C-nigrum* [illegible] August ; light ; treacle, and in fields by day.
48. *Agrotis haruspica* [illegible] on ; July and August.
49. " *fennica* Tausc[illegible] non ; July and August.
50. " *subgothica* [illegible] ; July.
51. " *plecta* Linn. Rare.
52. " *clandestina* Harr. [illegible] ; July and August.
53. " *ypsilon* Rott. Rare ; August.
54. " *occulta* Linn. Rare ; July.
55. *Mamestra lorea* Steph. } Common ; July.
56. " *renigera* Steph. }
57. *Hadena devastatrix* Brace }
58. " *arctica* Bd. } Common ; July and August ; by light,
59. " *dubitans* Walk. (?) } and treacle.
60. " *sputatrix* Grt. }
61. " *verbascoides* (?) Guen. Rare ; 1 specimen, July.
62. " *lignicolor* Guen. Rare ; July.
63. " *impulsa* Guen. Rare ; July and August.
64. " *mactata* Guen. Rare ; July.
65. *Hyppa xylinoides* Guen. Rare ; July.
66. *Trigonophora periculosa* Guen. Rare ; July, 2 specimens.
67. " *V-brunneum* Grt. Common ; July and August.
68. *Euplexia lucipara* Linn. Rare ; July.
69. *Apamea nictitans* Esp. Rare ; August.
70. *Heliophila pallens* Linn. Abundant ; July.
71. " *adonea* Grt. Rare ; July.
72. *Amphipyra tragopogonis* Linn. Rare ; August.
73. *Caradrina multifera* Walk. Rare ; July, 1 specimen.
74. *Orthosia helva* Grt. Abundant ; July and August.
75. *Cucullia intermedia* Spey. Rare ; July, 1 specimen found on a poplar.

76. *Abrostola urentis* Guen. Very rare; July, 1 specimen.
77. *Plusia æreoides* Grt. Common; July; light.
78. " *ærea* Guen. Common; August.
79. " *mappa* G. & R. Rare; August; light.
80. " *bimaculata* Steph. Abundant; July and August; light.
81. " *viridisignata* Grt. Common; August; day flier.
82. " *brassicæ* Riley. Common; July; light.
83. " *ampla* Walk. Rare; July; light.
84. " *simplex* Guen. Common; August; day flier.
85. *Pyrrhia exprimens* Walk. Common; August; light.
86. *Drasteria erechtea* Hübn. Common; July.
87. *Hypena humuli* Harr. Rare; August, 1 specimen.

GEOMETRIDÆ.

88. *Endropia obtusaria* Hübn. Rare; July.
89. *Metrocampa perlaria* Guen. Very common; July and August.
90. *Sicya macularia* Harr. Common; July; light.
91. *Amphidasys cognataria* Guen. Rare; August, 1 specimen.
92. *Deilinia variolaria* Guen. Common; July; light.
93. *Semiothisa enotata* Guen. Rare; July, 1 specimen.
94. *Thamnonoma subcessaria* Walk. Common; July and August.
95. *Lozogramma defluata* Walk. Common; July.
96. *Hydria undulata* Linn. Rare; August.
97. *Rheumaptera hastata* Linn. Common; July; by light.
98. " *lacustrata* Pack. Rare; July; by light.
99. *Hydriomena trifasciata* Bork. Rare; August.
100. *Petrophora diversilineata* Hübn. Common; August.
101. " *hersiliata* Guen. Rare; July.
102. " *populata* Linn. Common; July; by light.
103. " *prunata* Linn. Rare; July.
104. *Glaucopteryx cæsiata* Bork. Not rare; July.
105. *Eupithecia* ——— sp. Rare; 1 specimen, July.

PYRALIDÆ.

106. *Nomophila noctuella* S. V. Very common; August.
107. *Crambus girardellus* Clem. Rare; 1 specimen, August.

DESCRIPTIONS OF THE PREPARATORY STAGES OF SMERINTHUS EXCÆCATUS, A. & S.

BY WM. BEUTENMULLER, NEW YORK.

EGG.—Oval; pale apple green, smooth, shining; slightly flattened above and below. Width, 2 mm.; height, 1.50 mm.

Clemens, in his Synopsis of North American Sphingidæ, p. 182 (Journ. Ac. Nat. Sci., Phil., 18; egg as being "smooth, white, with an equatorial redd having a slender central white line." All the eggs, abou and fifty in number, which I examined were entirely green, ications whatever of the bands mentioned by Clemens.

Duration of this stage, six

YOUNG LARVA.—Head ratn subglobose, dull pale green; mouth parts pitchy black. Bod nd beneath uniformly yellowish-green, with the caudal horn very long d reddish-brown. As the larva advances in age there gradually appears along each side a series of eight lateral oblique yellowish bands, and a subdorsal longitudinal stripe of the same colour. The caudal horn also becomes somewhat brighter, and the head concolorous to the body. Length, 6 mm. Length, when ready to moult, 10 mm. Duration of this stage, about four days.

AFTER FIRST MOULT.—The head is now covered with yellow granulations, and the caudal horn is somewhat longer and more prominent, with a yellow band near the apex. The body has also now some few granulations on the anterior segments. The oblique lateral bands are brighter in colour, and the longitudinal subdorsal stripes are broken by the bands. Length, 13 mm. Duration of this stage, about six days.

AFTER SECOND MOULT.—Little difference from the previous moult, except in shape of the head, which now assumes a triangular form, and the granulations and markings are also somewhat more distinct, and the tips of the thoracic feet reddish-brown, with their bases green. Length, 16 mm. Duration of this stage, about four days.

AFTER THIRD MOULT.—The body in colour now is apple green, and is much stouter. The caudal horn is tipped with reddish-brown at the apex, and is covered with granulations, as is also the body, especially along the dorsal region on the first to the fourth segments. On each side of the head is an oblique band which meet at the vertex. Length, 23 mm. Duration of this stage, about six days.

AFTER FOURTH MOULT.—The body in colour is the same as in the preceding moult, and the caudal horn lacks the reddish-brown colour at the apex. The thoracic feet are now yellow, tipped with reddish-brown, and the abdominal legs have on the outer side of each a small patch of the same colour. The mandibles are pitchy black, and the labrum pink. Length, 34 mm. Duration of this stage, about seven days.

AFTER FIFTH MOULT.—No perceptible difference from the previous moult, except that the elevated granulations which cover the body are more distinct. The thoracic feet are reddish-brown with their bases yellow. Spiracles white with black margins. Length, about 55 mm.

FOOD PLANTS.*—Wisteria, cherry, spiræa, blackberry, apple, rose, plum, elm, oak, hazel, hornbeam, birch, willow and poplar.

The eggs were kindly sent to me from Cotuit, Mass., by Mr. Henry F. Crosby, of New York. Double brooded.

CORRESPONDENCE.

HYBERNIA DEFOLIARIA LINN., IN VANCOUVER ISLAND.

Sir,—In 1887 I took a specimen of *Hybernia defoliaria* at rest on an oak near Victoria. Mr. G. Hulst, who kindly looked over my Geometra in 1888, expressed a doubt as to the correctness of the locality, as *defoliaria*, though so common in England, had not been noticed by any American entomologists. Since the first capture I have several times seen larvæ which I am almost certain were of this species, for in the Old Country ten years ago I was familiar with the insect in all its stages. To-day, however (Nov. 18), I have satisfied myself by the capture of two males and one female of typical *defoliaria*. They were all at rest on fences in the City of Victoria, and two or three miles away from the locality where I first observed the species. Possibly this moth is an importation, and, if so, not a very desirable one, as in some parts of England it is considered quite a pest. GEO. W. TAYLOR.

The specimen mentioned above by Mr. Taylor, as taken in 1887, is now in my collection, and is, I should say, certainly a typical *H. defoliaria*. J. FLETCHER, Ottawa.

* See Food Plants of Lepidoptera, No. 2, Ent. Am., 1, p. 196.

CHIONOBAS BORE.

Sir,—We have in Colorado a butterfly identical, according to the determination of Dr. Staudinger (see C. E. XVIII., 15), with *Chionobas Bore* Lehn. and Hübner, and by the aid of Mr. David Bruce I have been able the past season to rear the larvæ from egg to adult stage, soon after reaching which hibernat[illegible] This has led me to inquire into Sandberg's history of *B*[illegible] ferred to by Mr. Scudder (Butt. N. E., p. 126), and on w[illegible] d on the subject, he very kindly looked up Sandberg's pap[illegible] me a translation of it. So far as I know no translation [illegible] been published, and I suggest that you print it in full, so tha[illegible] history of the American form is published—as it will be aft[illegible] eached—the habits on the two continents can be compared. [illegible] dy clear that our form does not hibernate through two winters. The la[illegible] al stages began on 16th July, and the fourth (and last) moult was reac[illegible] d 9th September, so that their duration to last moult was but about nine weeks. I hope to see pupæ soon after the winter passes, and shall then fully illustrate the species in "Butterflies of North America." W. H. EDWARDS.

Sandberg's article is contained in the Berliner Entomologische Zeitschrift, Vol. XXIX., 1885, Part II., pp. 245–265. It is entitled "Beobachtungen ueber Metamorphosen der Arktischen Falter."—*Anglice.* Observations upon the Metamorphoses of Arctic Lepidoptera. I gather from the preliminary pages that the author was for twelve years an official residing in Norwegian Finmark, and that he there made the observations which he records in his paper.

I send you a translation hurriedly made of what he has to say concerning *Oeneis Bore* at p. 247 *et seg* as follows :

1. *Oeneis Bore* Schn.

Egg cylindrical, marble-white, longitudinally ribbed.

Caterpillar clothed with fine hairs, bright brownish-yellow, ornamented by a narrow dark dorsal line, which terminates abruptly, and two broader dark lines, one upon either side. The head is globular, small in proportion to the body, greenish-yellow, with six dark lateral stripes, and black

eyes. The spiracles are of the same colour as the body. The latter is round, tapering posteriorly and with the back arched. The anus is two-pointed. (Zweispitzig.) Length 35 mm.

The caterpillar feeds upon different grasses, and is of an exceedingly sluggish disposition. When disturbed it curls up and remains for a long time without motion. It hibernates twice, and pupates in the month of May in its winter quarters among the roots of grass just below the surface of the ground. It is greatly subject to the attacks of ichneumon-wasps.

The handsomely coloured chrysalis is short and thick, provided with long and broad wing-sheaths, which, as well as the thorax, are of a bright green colour. The abdomen is bright reddish-yellow, with dark spots and a bright green line upon the dorsal aspect, together with a darker line of the same colour upon either side; the spots in the vicinity of the middle line are arranged in pairs upon each segment; the cremaster is short and blunt; the region of the head is adorned on each side by a coal-black, shining streak, which is bent into the form of a half-moon.

The chrysalis, which, as in the case of all Satyrids, is stiff and incapable of motion, and when moved gives no evidence of life, is attacked by parasites of a larger species of ichneumon than attacks the caterpillar. The imago is disclosed after the lapse of from three to six weeks from the date of pupation. The transformations have been hitherto unknown.

This thoroughly Arctic species, which hitherto has not been found south of Lat. 68–69 N., was first detected by Dr. Staudinger upon Norwegian territory in the year 1860, by a pair of specimens coming from Kautokeine in Finmark. Later, in the year 1875, the butterfly was taken by me in numbers upon the sandy meadows near Jacobsely, close to the margin of the Arctic Ocean, in profusion in the interior at Nejden, at Skogerönes ten Kilm, nearer to the sea, and in scattering examples upon the crags at Kirkenes. In Russian Lapland, upon the stretch of country lying between Jacobsely and Kola, this species of butterfly is of very common occurrence. Upon the Norwegian coast, west of Warangerfjord, it has, nevertheless, not been as yet observed.

The caterpillar was found for the first time upon May 15th, 1880.

A single hibernating example, about 10 mm. (about four-tenths of an inch, which would be after second moult), was detected in withered grass upon the barren sand-banks near Jacobsely, and here later in the year a second almost thoroughly matured specimen of the same species was captured. As was to be surmised from the abundance of the butterfly in grassy spots, the larva feeds upon different species of grasses, especially *Festuca ovina*, with which the level reac ely are everywhere overgrown. The theory broached by n in his "Oversigt over de i Norges arktiske Region hi doptere, Kristiania, 1879," and which is founded upon the de by Prof. C. Berg, of Buenos Ayres, in the case of another s genus, viz., *Oen. Gutta* Hb., viz., that the larva feeds upo as, in consequence, not been established.

The caterpillars which had be ted attained their full development about the end of August, and then to feed, and sank into a lethargic condition. As they gave no evidence of a disposition to pupate, I buried them toward winter, at the end of September, in the ground. On the 15th May of the following year their winter quarters were opened, and one of the caterpillars was found to be dead, the other, on the contrary, appeared to be in a very healthy condition, and crept around lustily without, however, taking any nourishment. Its good health was unfortunately only apparent, for the little creature in a former stage of its larval existence had been stung by an ichneumon-wasp, the larvæ of which were ready to pupate upon May 23rd, and in the end, as they broke through the outer integuments of their host and emerged into freedom, gave the deathblow to the unfortunate victim of misplaced hospitality. These little larvæ transformed speedily, and presently the caterpillar was enveloped by about fifty greyish-white cocoons, which, after the lapse of five weeks in the latter days of June, disclosed the imagines. Thus all the hopes I had built upon these larvæ were brought to an end, and it was not my good fortune until in the spring of the following year, when I again visited Jacobsely, to find fresh specimens. The caterpillars at this time appeared in numbers scattered throughout the grass, so that in the course of a few hours I succeeded in collecting about fifty full-grown examples, among them, unfortunately, not a single example which could be used, inasmuch as they all appeared to have harbored guests during the winter, and were all decorated with from forty-

six to fifty-four parasitic cocoons of the same species as that before observed. Some of the hosts had died during the process, others were still alive; but all further development was at an end in the case of the latter, and at the end of eight days the last one died. Inasmuch as not a single uninjured specimen was to be found among so many caterpillars, I reached the conclusion that the place to look for the chrysalids was under the ground, and that only these caterpillars which were forced by the pressure of the circumstances which I have related, made excursions to the upper world.

The parasitic cocoons which I had collected disclosed the first wasps on the 20th day of June, and pupation, therefore, must have occurred about the middle of May. Their hosts must, therefore, have awakened from their winter's sleep at the beginning of May, and, therefore, their pupation, if everything had progressed favorably, would have taken place probably in the course of the two following weeks. My diligent search for pupæ was for a long while fruitless, until at last on the 25th of May I succeeded in digging up one. It was lying free in the sand concealed under the roots of grass. The transformation had just taken place, as was shown by the skin of the caterpillar, which was quite fresh and still clinging to the anal extremity. The chrysalis on the 24th of June disclosed the butterfly of *Œneis Bore* in a beautiful male example. From four to six days before the butterfly emerged from the chrysalis the wing-sheaths had assumed a dark yellowish-grey, and at last quite bluish-black colour. On the 31st day of May I found still another chrysalis of the same species lying in the grass, but brown in colour. This produced no butterfly, but, upon the 17th and 18th of June following, three specimens of ichneumon-wasps of another much larger species than that which had infested the caterpillar.

In the spring of the year 1883, which, for our high latitudes, was unusually early and warm, this butterfly was observed as early as the middle of June upon the crag at Südwaranger Prestegaarde. At Jacobsely I found on the 15th and 20th of May, under moss in barren spots, concealed among the roots of grass, two caterpillars, which both transformed five days later, and on the 10th and 13th of June following disclosed the imagines (two ♂ ♂). The duration of the chrysalis stage of existence was, therefore, scarcely three weeks. W. J. HOLLAND.

BOOK NOTICE.

INSECTA: By Alpheus Hyatt and J. N. Arms. Boston: D. C. Heath & Co.

This handy volume forms the eighth of the series of the "Guides for Science Teaching" issued by these well-known publishers of educational works. The series is [illegible] e of teachers who wish to give practical instruction to [illegible] Natural History. The volume before us forms a marked [illegible] those previously issued, inasmuch as it consists of 300 [illegible] r 200 illustrations, while none of the others were more tha[illegible] these dimensions. This great enlargement is due, no doubt, to [illegible] ring popularity of entomology as a subject for the teaching of obse[illegible] in schools, as well as for intelligent recreation and serious study on the part of individuals.

The volume before us is an admirable manual for teachers who wish to instruct their pupils in the science of entomology, and will be found most useful also by private students. It is full of admirable diagrams and illustrations, for the most part original, and it takes up for discussion some of the commonest insects in the different orders that can be readily procured by anyone. For instance, the external structure and the internal anatomy of insects are first taught by means of the common Locust (*Caloptenus*), which can be taken in quantities anywhere, a May-fly (*Ephemera*), a Dragon-fly, a Cockroach, a May-beetle, the ***Archippus*** butterfly, etc., are used to illustrate the different orders. No teacher or student need be at a loss for material with which to follow out the instructions in the book. The whole work is excellent, and we have no doubt that it will be found most valuable in the various agricultural colleges especially, as well as in other educational institutions.

We may quote the following advice from the opening chapter:—"Encourage children to watch living locusts.....Better a child should learn to handle one animal, to see and know its structure and how it lives and moves, than to go through the whole animal kingdom with the best text-book, under the best teacher, aided by the best charts ever made. The former would have learned what real knowledge is, and how to get it, while the latter would have simply learned how to pass at his school examination."

Mailed January 6th.

The Canadian Entomologist.

VOL. XXIII. LONDON, FEBRUARY, 1891. No. 2.

NOTES ON A FEW CANADIAN RHYNCOPHORA.

BY W. HAGUE HARRINGTON, OTTAWA.

Rhynchites bicolor Fab. has not that general distribution, in Canada at least, that is believed by Mr. Wickham, who remarks (CAN. ENT., Vol. XXII., p. 171): "In fact I doubt if there is a spot on this continent where roses grow that *Rhynchites bicolor* does not inhabit too." On the Pacific coast it is certainly a very common insect, as I found at Victoria, V. I., and New Westminster, B. C., in May and June, 1888. At some points also in the Northwest Territories it is abundant, for my brother sent me many specimens from Moosejaw, Assa. But as we come eastward it seems to disappear. Pettit does not record it in his list of the Coleoptera of Grimsby, nor does Cooper or Provancher give it as occurring in Quebec. It does not appear in any of the catalogues published by the Geological Survey of Canada, nor in that of Hubbard and Schwarz of the Coleoptera of the Lake Superior region, the fauna of which is almost identical with that of Ontario. It certainly can scarcely occur in the vicinity of Ottawa, as both Mr. Fletcher and I have carefully examined our various species of roses for several years and have not observed it.

Rhynchites cyanellus Lec. occurs quite frequently on small willows, sometimes in copulation, and the beetles seem to feed upon the leaves. *R. æratus* Say has only been found once by me, when two specimens were taken upon Bitter Hickory *(Carya amara)*.

Attelabus rhois Boh. is the only representative of the family which is found at Ottawa, and is of rare occurrence. The few specimens taken have been on oak and basswood, but I have found upon birch several leaves rolled probably by this species, but from which I did not succeed in rearing the beetles. Provancher gives it as ordinarily found upon hazel, but not common.

Barynotus Schœnherri Zett. This species has had a place in American Check Lists on the strength of a specimen received by LeConte from Newfoundland. In August, 1884, I was, however, fortunate enough to

collect at Sydney, Cape Breton, N. S., several beetles which ultimately proved to belong to this species. A short time after I obtained them I sent one to a correspondent in the United States and he named it *Tricolepis alternata (?)*. Last winter, in trying to get my Rhyncophora in better shape, I found that some mistake had been made, and after a careful examination of the beetles I decided that they must be *B. Schænherri*, and my finding was at o[illegible] Dr. Hamilton when I sent him a specimen. The beetle[illegible]nder logs or drift wood, chiefly near the "ballast heaps,"[illegible]overed with scales, as compared with the one mentioned b[illegible] not so bright and fresh looking as specimens I have recen[illegible]n England. I made a hurried search for it in September last in[illegible]e locality, but did not find any. The "ballast heaps," I may a[illegible]ied by vessels discharging their ballast of stone, earth, etc., be[illegible]g coal, and many species of introduced plants are found on, or [illegible]m.

Agasphærops nigra Horn has been several times recorded, but the specimens appear to have been old rubbed ones. A specimen in my collection from Vancouver Island shows it to be a more striking beetle than the description indicates. The elytra are ornamented with interrupted irregular bands of pearly and golden scales intermixed, and roughly forming humeral and apical lunules. The anterior and lateral margins of the prothorax are also irregularly clothed, and patches occur on the head and ventral surface. The style of ornamentation is similar to that of *Hormorus undulatus* Uhler. which LeConte (classification p. 439) states to be more ornate.

Otiorhynchus sulcatus Fab. was found by me at Sydney in August, 1884, and again in September last. It is apparently quite abundant, as at several points I found fine fresh specimens under boards, etc. Provancher states that this beetle is common in Quebec, and adds, "we think that its larva lives in haws, as we have nearly always found it beneath hawthorns and apple trees."

Otiorhynchus sp. With the preceding species I found at Sydney, both in 1884 and 1890, specimens of a blackish *Otiorhynchus* which has not been identified. It is in all probability a European species, but does not agree with any I have received, and has not been recognized by Dr. Hamilton, or by Dr. Horn, to whom he showed a specimen. It is larger, rougher and blacker than *O. ovatus* Linn. which, curiously, appears to be very rare at Sydney, as I only obtained one specimen.

Strophosomus ? This is another species which was found at Sydney in 1884 and 1890 and which does not appear to be uncommon. My specimens were obtained under logs, above high-water mark, and among the grass roots exposed along the sides of the depressions caused by the logs. The species has a marked general resemblance to *Strophosomus coryli* Fab. recorded from New Jersey by Mr. Jülich (Ent. Am., Vol. V., p. 56), but has the legs almost concolorous with the body, and has the head and thorax ungrooved. It is a European species, for in an old case of English beetles which recently came into my possession, I find five specimens of this species placed with three of *S. coryli*, having either been confounded with that species by the maker of the collection, or having lost their label subsequently. I have hitherto considered this beetle an otiorhynchid, not having microscopically examined the mandibles, but it may be more nearly allied to *Strophosomus*.

Aramigus Fulleri Horn appears to be steadily extending its range, and in 1889 one of our city florists suffered a very severe loss from the beetles obtaining a foothold in his rose-house, evidently with imported plants. Not understanding the attack, he had attributed the injury to other causes, and had allowed the beetles to breed, so that in December when I visited the houses both beetles and grubs were abundant. He had then, however, commenced the vigorous application of remedies suggested to him by Mr. Fletcher.

Scythropus elegans Coup. occurs abundantly upon white pine, and varies in colour, as mentioned by Mr. Chittenden (Ent. Am., Vol. VI., p. 168). I have also found it upon spruces, but not frequently.

Podapion gallicola Riley forms numerous galls on the young branches of red pine *(Pinus resinosa)* within a few miles of Ottawa, and Mr. Fletcher, who has visited the lumbering districts, informs me that the galls are very abundant upon the same species in some sections.

Lepyrus geminatus Say is a common species upon willows, but I have not been able to discover the larva. Mr. Wickham, in his Vancouver notes, says "*Lepyrus* is common upon willow," referring to *L. gemellus* Kirby, or *L. colon* Linn., which are both recorded from the West Coast, but probably to the former, as it, or a closely allied species, is apparently common. This genus has a very northerly distribution (through Hudson Bay region, Alaska, etc.), and willows also range far north, so that it is not unlikely that all the species infest these trees.

Listronotus. Of this genus several species occur upon semi-aquatic plants, but it may not be generally known that they appear to be more readily attracted by lights than most rhyncophora. Such I found to be the case one summer, when considerable numbers came to lights placed on a balcony for moths, although the house stood on a hill at some distance from the water (Rideau river).

Pachylobius picivorus [illegible] by Mr. Beutenmuller (CAN. ENT., Vol. XXII., p. 202,) [illegible], because in a list of insects found upon that tree (Tra[illegible] d Nat. Club, No. 2, p. 33,) I mention *Hylobius stupidus.* [illegible] so referred to I have since found to be only somewhat larger sp[illegible] s of *H. pales*, which were so labelled in the collection of the la[illegible] illings, and probably in other Canadian collections. While spea[illegible] his genus I may mention that I once found a hibernated specim[illegible] *Y. confusus* Kirby which had punctured with its beak the tub[illegible] m of the Mayflower (Trailing Arbutus, *Epigea repens)* and [illegible]ppa[illegible]ntly feasting on the nectar therein. I do not recollect the date, but snow was still upon the ground in sheltered spots.

Tanysphyrus lemnæ Fab. is very abundant during the summer upon Lemna, upon the surface of which hundreds may sometimes be seen crawling. I have also obtained many, by sifting, from moss in which they hibernate, and the specimens so obtained are cleaner than those taken in summer, which are frequently encrusted with mud or slime.

Magdalis. Dr. Hamilton (CAN. ENT., Vol. XVIII., p. 115) separates from *M. Lecontei* Horn a bluish species from Eastern Pennsylvania and Canada. What appears to be this species is common here upon young pines, especially stunted ones growing in stony or poor ground. Specimens vary considerably in the punctuation of the thorax, and some approach the form with canaliculate thorax, which he mentions as found on spruce.

Anthonomus corvulus Lec. is found in profusion upon the flowers of Cornel *(Cornus)* in May, and is readily recognized by its small size, its apion-like form and shining appearance. It varies slightly in size, but not apparently in other respects.

Orchestes. The various species of this genus are found, as recorded, upon willows, especially in spring. *O. pallicornis* Say is always common, and *O. rufipes* sometimes so on trees in moist localities. *O. niger* Horn

was last season as plentiful as *pallicornis*, although seldom taken previously. *O. subhirtus* Horn, and *O. ephippiatus* Say are very rare. I have also one specimen (captured a few miles north of Ottawa on 4th June) of a species which is entirely rufous, except the pectus. It is about the size and form of *pallicornis* and appears to be undescribed.

Acalyptus carpini Hbst., *Elleschus bipunctatus* Linn., and *E. ephippiatus* Say may all be found in profusion on willows, when they are in bloom. The second species varies a good deal in its coloration.

Piazorhinus scutellaris Say is not very rare, but my specimens have been mostly accidental captures by sweeping or sifting. I have, however, found it upon hickory in July.

Miarus hispidulus Lec. has not occurred at Ottawa yet, but is abundant in some parts of Ontario. At London on 15th Oct., 1885, I found the seed capsules of *Lobelia inflata* very extensively attacked by larvæ from which I reared a large number of beetles.

Pseudomus truncatus Lec. By an unfortunate clerical error of a correspondent I was led to record this species as occurring at Ottawa upon butternut. On the appearance of my List of Ottawa Coleoptera (Trans. Ottawa Field-Nat. Club, No. 5, p. 71) this species was questioned by Mr. Schwarz (it occurring only in the Southeastern States), and on examination the species was found to be *Cryptorhynchus parochus* Hbst. (Crotch 9233 instead of 9223). I regret that such a mistake should have been made, especially as Mr. Beutenmuller has quoted the record (CAN. ENT., Vol. XXII., p. 258).

Piazurus oculatus Say is rare here, but I find two specimens labelled as taken upon basswood on 21st July.

Acoptus suturalis Lec. has been found quite abundantly, sometimes in copulation, on hickory stumps about the end of June.

Mononychus vulpeculus Fab. This rotund little beetle can always be found upon the flowers of Iris in spring, busy love-making or puncturing the base of the flower and depositing its eggs. In autumn it can be obtained in any desired number from the pods, few of which are sometimes free from it. Many of the beetles are, however, destroyed by *Pimpla pterelas* Say, which I have bred in large numbers from the infested pods.

Cœliodes nebulosus Lec. occurs abundantly in June upon mixed vegetation near water, but I have not ascertained what plants it especially

frequents. *Ceutorhynchus*, *Pelenomus*, *Cœlogaster* and *Rhinoncus* occur under similar conditions, and also in moss obtained from such localities in the fall.

Centrinus rectirostris Lec. may be found in June, in wet localities, upon Club-rush *(Scirpus eriophorum)*, and about the middle of the month the beetles are abundant and are often seen in copulation, or depositing their eggs in the lower p ms. The larva is a moderately stoutish white grub abou an inch long, with a brownish head, the sutures of which he burrow sometimes goes down nearly to the root, and exte... eral inches. The larva generally winters in the upper part of the burrow s as to be safe from the spring flooding of the ground, and abou y transforms to the pupa; the time of the change and the duration is stage being probably largely dependent on the weather. Some years he grubs are extremely abundant and scarcely a stem of the *Scirpus* in some localities is without its occupant. It is very rarely, however, that more than one grub is found in a stem.

Centrinus prolixus Lec. is common some seasons upon sedges and aquatic plants, but the habits of the larvæ are unknown to me.

Sphenophorus pertinax Oliv. lives in the lower portion of the stem of the Cat-tail Flag *(Typha latifolia)*, and its larva and that of the moth *Arzama obliquata* often inhabit the same stem.

Stenoscelis brevis Boh. has been taken on oak, as well as on some of the trees named by Mr. Chittenden (Ent. Am., Vol. VI., p. 99), and my observations of its habits fully confirm his statement that it bores only in standing timber denuded of bark.

Cossonini. Two specimens of a small species were obtained at Sydney in 1884 under the bark of a dead spruce. I am informed that Dr. Horn has the same species from Mass., but it is not described. A species of similar size, but belonging to another genus, occurs here, also under the bark of spruce.

Dryocœtes affaber Mann. has been observed boring in terminal shoots of the branches of large white pines, and the cones and twigs (the former chiefly) of the red pine are much infested by this species or *septentrionalis* Mann. The attacked cones may be easily recognized by their stunted and shrivelled appearance, they seldom exceed the size of an acorn. Several larvæ may be found in one cone, and the beetles seem to spend the greater part of their time burrowing in the cones, as I kept a lot of

infested cones in a tin box, and the beetles could seldom be found out of their burrows.

Dendroctonus simplex Lec. A very extensive attack of this beetle was observed a few years ago in a grove of large larches about three miles from the city. In August, when I first noted the sickly appearance of the trees, I found that the bark, apparently all over the trees (the tops could not be examined), was riddled and loosened, and thousands of these beetles with larvæ and pupæ were observed. The trees were, of course, killed, but whether the injury was due entirely to this species, or that the trees had been weakened by other causes I cannot say. I could find, however, no other injuries such as to account for the death of so many large and, previously, apparently vigorous trees.

VANESSA CALIFORNICA.

BY W. G. WRIGHT, SAN BERNARDINO, CALIFORNIA.

It is reported from various quarters that *V. Californica* has within a year or two first been observed in British Columbia, where it is now regarded as something new and strange. It has been suggested to me that a few facts about it, as to California and Oregon, would be of interest.

I have observed it in great numbers from near the Canada line in Washington and Idaho almost to Mexico. Doubtless it ranges down into the Mexican State of Lower California, 200 miles or more, to the great mountain of San Pedro Martier, in latitude 30° N., or the same as St. Augustine, Florida. Its range, as to altitude varies according to latitude. In the more northern places it flies from tide water to the tops of the highest mountains, at 14,500 feet. In the warmer regions of South California it becomes "a stranded butterfly," (if, indeed, there be such a thing,) and is seen only on high elevations and the tops of mountains, and never at any season of the year in the valleys.

In South California it is not seen lower down than 3,000 feet above tide, and from that up to and above the tops of the highest mountains. In that region, near the Mexican line, is a mountain 11,900 feet high, as repeatedly indicated by my barometer, and on that high crest I have seen vast numbers of this *Vanessa* flying over. One day in September, 1880, I was there as guide with a party of strangers, and the butterflies were so thick that even the tenderfeet noticed them. The insects came flying up the western sloping side of the crest upon the wings of the trade wind

moving faster than anyone could follow, and upon reaching the crest, instead of dropping rapidly down the precipice on the eastern side, as they might have been expected to do, they kept right on at the same angle of elevation directly up into the air and out of sight, as if they were going to the moon. In coming up the slope they all made directly for the highest peak, and did not drop over the side of the crest, as they might easily have done. [illegible] was with them. So, on Mt. Hood, in Oregon, *V. C[illegible]* countless millions. About the great glacier, at an elevat[illegible],000 feet, I have seen them in vast numbers flitting about [illegible] trees or resting on the ground in the warm spots. I neve[illegible] the high peak of Mt. Hood, but the guides, and every one e[illegible] ad been high up, spoke of the clouds of this one butterfly to [illegible]pon the peak. Sometimes the remark was made that "they [illegible]g in one direction."

The larval food plant in [illegible]s Manzanita. Doubtless the larvæ feed also on other plants, as must necessarily be the case in a species so widely spread. The butterfly itself is but rarely seen feeding on flowers. It is often seen at water on the sands of little mountain streams, and is oftenest captured in such places, as its flight is so rapid and strong that it is difficult to capture one on the wing. I had often marvelled that it is so seldem seen on flowers, and at length, several years ago, found it in numbers feeding on sap or dampness that envelops the freshly opening young leaves of fir trees, *Abies*. They were so eager and absorbed in lapping up this nectar that I could pick them off with my fingers, or push the cyanide bottle over them without alarming them, and did so capture a number, which is saying a good deal for a butterfly that is so uniformly wild and difficult of approach. From this circumstance, and from other corroborative indications, I judge that the sap of *Abies* is their chief food in the imago state.

This species of butterfly, like *P. Cardui*, is something of a hoodoo: it is of no value itself, it is usually present when you don't want it, and its appearance seems to be the signal for more interesting species to disappear. It is also of quite a quarrelsome disposition, taking delight in dashing at a nice *Argynnid* or other nice thing just as you are about to capture it, and chasing it out of sight. For all these things, and for others, it is no pet of the butterfly man, and if it has recently irrupted into British Columbia the invasion is one that will give the lepidopterists of that country no joy, it is evident.

NEW N. A. MICROLEPIDOPTERA.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Psecadia delliella n. sp.

Expanse of wings, 21 mm. Palpi white, with the outside of the first two joints black. Head white. Antennæ brown, white above basally. Thorax snow white, with two black bands, one across the middle and the other across the scutellum.

Forewings snow white, with a satin lustre and crossed by five more or less interrupted nearly equidistant bluish-black stripes. The first is nearly straight and extends from the costa nearly across the wing; the second crosses at the basal fourth of the wing and is angulated outwardly near the middle of the wing; the third arises from the costa just before the middle, is angulated outwardly at the middle of the wing and ends at the middle of the hinder margin. This stripe is sometimes interrupted near the middle, and is more or less completely connected with a spot outside of it on the upper side of the cell. The fourth stripe starts from the outer fourth of the hinder margin and extends up to the fold where it stops. A little above and outside of this is an elongated oblique spot. The fifth stripe runs from the anal angle up to the end of the cell where it branches, one branch continuing in the same course up to the costa but broken at the point of branching, the other branch extending obliquely up and inward nearly to the costa where there are three or four costal marks of different sizes. Outside of this stripe, on the middle of the wing, are two dashes, not in the same line, but sometimes connected. About nine spots of unequal size, more or less confluent, rest on the outer edge of the wing, three on the costa and the rest on the outer margin. A small black spot rests on the base of the costa. The basal half of the fringe is orange yellow and the outer half smoky-brown.

Hind wings, above and beneath, white basally, pale fuscous apically, fringes white. Underside of forewings dull whitish, with fuscous along the costa and outer border, and faintly showing the marks of the upper side.

Abdomen dark smoky brown, the segments edged with whitish. Anal tuft, and second segment orange yellow. Underside white with a black spot on the middle of the basal part of each segment. Forelegs black with the joints tipped with white, and the fore coxæ are white with a

black stripe on the outside. The middle and hind legs are white and ringed with black.

Habitat, Texas.

Described from one female in my collection, and one male in the collection of Mr. A. Bolter.

I have named this beautiful little insect for Miss Dellie Stebbins, who has ably assisted me for [illegible] rs in my entomological work.

Propexus magnificus n.

Expanse of wings, 40 m[illegible] nd palpi pale fawn color, the latter as long as the head [illegible] and mixed with black scales. Maxillary palpi somewhat lighter. [illegible] ennæ white above and ringed with dark; the pectinations are black. [illegible]horax pale fawn coloured with a dorsal white stripe, and the inner e[illegible] f the patagiæ is also white.

The forewings are pale fawn col[illegible] and mixed more or less with darker scales, except on the costal region and a stripe along the fold. The costa and hinder border are narrowly edged with white, and the veins are striped with white, the median stripe being much the widest; all are more or less expanded on the outer border. Fringes white and cut with two parallel lines of the ground colour of the wings.

Hind wings and abdomen very pale fuscous. Fringes white. Underside of all the wings pale fuscous, the forewings being the darkest. Underside of the body, and all the legs, pale fawn coloured, the latter marked with white on the inner side.

Described from two males taken at Salida, Colorado, June 11, 1888, and sent to me by the Rev. Geo. D. Hulst, from whom I have received numerous favours.

Schœnobius maximellus n. sp.

Expanse of wings, 63 mm. Head, palpi, thorax and forewings dull ochre yellow. The labial palpi and forewings are sprinkled uniformly with dark brown atoms, and the forewings have a brownish shade extending outwardly over the cell, a terminal row of dark brown dots resting one each on the ends of the veins; a row of indistinct brown spots extending from the apex in the direction of the outer third of the hinder margin; a similar spot resting on the median vein near the origin of vein 2, and another at the end of the median vein. Fringes of the same colour as the wing but without the brown sprinkles.

Hind wings, and abdomen above and beneath, very pale yellow and sprinkled with brownish atoms; the former with a terminal row of dark

brown dots, and the latter with irregular fawn coloured patches on the second, third and fourth segments. Underside of all the wings lighter than above and with terminal brown dots. Legs dull ochre yellow and more or less sprinkled with dark atoms.

Described from one female in my collection, taken in Austin, Texas.

DESCRIPTION OF A NEW SPECIES OF EREBIA, AND NOTES ON THE SO-CALLED CHIONOBAS BORE OF COLORADO.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Erebia Ethela.

MALE.—Expands 1.5 inch.

Upper side dark brown; both wings have a common extra-discal band of red-fulvous elongated spots, on primaries six, filling the interspaces from lower branch of subcostal to submedian, the second and third from the top a little longer than the others, these last being equal; at the end of the cell a small fulvous patch. Secondaries have five spots, the fifth being in second median interspace, the upper three equal, sub-oval, the fourth about half the size of the third, and the fifth still smaller; fringes of both wings concolored.

Under side of primaries dark brown along the margins to the continuous fulvous band which replaces the spots of upper side; the cellular patch much diffused; all the wing inside the band obscure fulvous on dark brown ground. Secondaries dull black with a grayish tint; the spots repeated, but in yellow-buff, with scales of fulvous about the edges; inside the cell, and against subcostal nervure a small patch of buff scales, less bright than the spots.

FEMALE.—Same size.

Same colour and similarly marked; underside as in the male.

From two ♂, two ♀, sent me by Professor Edward T. Owen, part of fourteen examples taken by him in the Yellowstone Park, June, 1890. This species is allied to *Epipsodea*, is smaller, and quite otherwise ornamented with fulvous. The change from fulvous on upper side of secondaries to buff is similar to what is sometimes seen in *Erebia Pyrrha* of Europe. Esper's figure of *E. Pharte*, ♂, pl. cxx., fig. 3, represents a species of the same size as both sexes of *Ethela*, and the markings are similar in character, only that on upper side the fulvous

spots of forewing make a continuous band, and are broader than in *Ethela*, and beneath hind wing the spots are red instead of yellow.

Probably *Ethela* is a dweller in Colorado also, as the late Mr. W. S. Foster told of a small *Erebia*, distinct from *Epipsodea* and *Callias*, which he had seen an example of in Marshall Pass, and which had red spots on the wings.

At the request of Prof. this species in memory of his daughter, Miss Ethel, who the capture of these Erebias, and whom he has since unh.

Professor Owen also took the ...ale of *E. Haydenii*, not before observed. It is in all respects like the male.

After the translation of Sandberg ...per was sent to the CAN. ENT. (see XXIII., 16, Jan., 1891), I re from Dr. Staudinger a letter saying that he was satisfied his ...ation of the Colorado form of *Chionobas*, in 1886, as identical v ...land *Bore* was wrong. That he had recently received six perfect examples of this Colorado form, and a very large number of true *Bore* from Norway and Lapland. "I see that this species, even in one locality, offers much variation. With one or two exceptions, all have on the under side of the secondaries the veins white like *Taygete* Hübn., from Labrador. Some are hardly to be distinguished from them, and, therefore, I believe *Taygete* of Labrador a local form of *Bore* Hübn.

"*Crambis* Freyer is described from Labrador specimens, and these also show much variation, and I have some which come so near to some of *Bore* that they are difficult to separate.

"Now as to the Colorado specimens: some varieties of the European *Bore*, without white veins on under side of secondaries, come so near to these (of Colorado) that from one specimen only (as in 1886) I could suppose this to be *Bore*. But as I now have six before me, and no one has the white veins like *Bore*, or only very little white, as sometimes is the case also with *Crambis*, of Labrador, I can only believe this a grayish (instead of brownish) form of *Crambis* Freyer. Also, except in the colour, the underside of the primaries of this Colorado form agrees perfectly with the true *Crambis*." In another letter he says: "I would counsel you to name this, perhaps, *Crambis*, var. *griseous* or otherwise."

I have four *Crambis* from Labrador, 2 ♂, 2 ♀, sent me by the late H. B. Moschler, as *Crambis* Freyer. All are dark brown, of thick

texture of wing, quite opaque. On the underside, the forewing is not distinguishable in colour or marking from *Semidea;* the hind wing is dark —a dusky gray, the band within its bordering lines darker, or brown. It closely resembles *Semidea* of Labrador, as determined by Moschler.

I have under view eleven of the Colorado form in question, 5 ♂, 6 ♀, and have seen several others. All are or were gray-brown above, of slight texture of wing, so transparent that the white labels on the pins are distinctly seen through the wings when viewed vertically. All have the band beneath the hind wings gray-white within, and there is a considerable space outside of and next to the band on either side of pure white, forming a conspicuous feature; the rest of the wing, at base and over extra-discal area, is gray-white. The band has similar outline and breadth to that of *Crambis* of Labrador, with variations in both species, and the band of the Labrador *Semidea* is similar to the other two.

As to the forewing beneath, except that in the Colorado form the colours are paler, that form is closely like *Crambis* and also *Semidea*, both of Labrador and White Mountains, of New Hampshire.

I have eight *Taygete* Hübn. from Labrador and Alaska, and the band is of the same character as in all the other species mentioned, varying in outline, but the veins are white in all the eight, as Dr. Staudinger says *Taygete* should have the veins. Also this species is usually yellow-brown; one Alaskan example is dark brown.

In Dr. Staudinger's view the Colorado form is a permanent variety. It certainly is completely isolated, and for untold ages must have been as much so as to-day. A permanent variety in such case is a species. If it originally branched from the Labrador *Crambis*, and of this we are absolutely ignorant, it has lost all connection; breeds true, and fulfills every requirement of a species. And as a species I regard it. Considering that we owe all our knowledge of it to Mr. David Bruce, who, during the last three years, has taken great pains to investigate its localities and habits, and has obtained eggs whereby I have been able to rear the species to adult larval stage, I cannot do otherwise than name it *Chionobas Brucei.*

Mr. Bean, at Laggan, Alberta, has taken a single specimen of this *Brucei.* Mr. Bruce has taken more than 300, and he tells me the peculiar characteristics which I have enumerated have been found in the whole of them.

FOOD PLANTS OF SOME BOMBYCIDÆ AND NOCTUIDÆ NOT INCLUDED IN H. EDWARDS'S CATALOGUE.

BY ROLAND THAXTER, NEW HAVEN, CONN.

The following brief list of food plants of Bombycidæ and Noctuidæ, not included in the recently issued catalogue of Mr. Henry Edwards, may be of some interest to pe[illegible] rearing Lepidoptera. When not otherwise stated the in[illegible] found and reared, or reared from the eggs by myself, an[illegible] collected at Kittery, Maine :—

Orgyia nova Fitch. Pinus strobus
" *definita* Pack. Quercus.
Parorgyia basiflava Pack. Betula.
Limacodes biguttata Pack. Carya.
" *fasciola* H.-S. Carya.
" *Y-inversa* Pack. Carya.
Packardia geminata Pack. Carya.
Ichthyura strigosa Grote. Populus.
" *indentata* Pack. Salix.
" *vau* Fitch. Populus.
Gluphisia trilineata Pack. Populus.
Notodonta stragula Grote. Populus.
Lophodonta ferruginea Pack. Betula.
" *Georgica* H.-S. Quercus.
Seirodonta bilineata Pack. Quercus.
Œdemasia eximia Grote. Salix, Populus.
Dasylophia anguina A. & S. Baptisia.
" *interna* Pack ? Carya.
Cælodasys biguttata Pack. (*Schizura ipomeæ* Doubl., Lec., Pack). Acer, Ulmus, Quercus, Betula, Vaccinium, Ceanothus.
" *leptinoides* Grote. Carya.
Heterocampa obliqua Pack. Quercus.
" *guttivitta* Walk. Quercus, Carya.
" *biundata* Walk. Carya.
Cerura aquilonaris Lint. Populus.
Prioma bilineata Pack. Betula.

Callosamia angulifera Walk. Liriodendron.
Artace punctistriga Walk. Diospyros virginiana.
Tolype laricis Fitch. Pinus, three species.

NOCTUIDÆ.

Leptina dormitans Guen. Carya.
Habrosyne scripta Gosse. Lilia.
Audela acronyctoides Walk ? Abies balsamea.
Charadra deridens Guen. Ulmus.
Raphia frater Grote. Populus.
Feralia jocosa Guen. Abies canadensis and balsamea.
Apatela vinnula Grote. Ulmus.
" *occidentalis* G. & R. Pyrus malus.
" *furcifera* Guen. Prunus serotina.
" *funeralis* G. & R. Carya.
" *dactylina* Grote. Salix, Betula, Alnus.
" *hastulifera* A. & S. Alnus.
" *persuasa* Harv. Quercus (Chapman).
" *clarescens* Guen. Rosaceæ (esp. Pyrus malus).
" *ovata* Gr. Castanea.
" *dissecta* G. & R. Acer.
" *sperata* Grote. Rubus.
" *xyliniformis* Guen. Rubus.
" *lanceolaria* Grote. Found on Comptonia not feeding. Probably a general feeder like *oblinita*. Figured in Abbott's unpublished drawings on *Gaillardia*.
Harrisimemna trisignata Walk. Diervilla, Ilex verticillata.
Agrotis trabalis Grote ? Pinus strobus.
" *astricta* Morr. Helianthus.
Oligia versicolor Grote. Pinus strobus. Abies Canadensis.
Homohadena badistriga Grote. Lonicera cult.
Gortyna Harrisii Grote. Heracleum lanatum.
Nonagria subflava Grote. Scirpus.
" *oblonga* Grote. Typha.
Macronoctua onusta Grote. Iris versicolor.
Euthisanotia timais Cram. Pancratium, Narcissus.
Scolecocampa liburna Geyer. Various species of Corticium Polyporus and other of the larger Basidiomycetons fungi.

Crocigrapha Normani Grote. Quercus.
Xylomiges confusa Hübn. Quercus.
Scopelosoma Moffatiana Grote. Hamamelis.
Litoprosopus futilis G. & R. *Sabal palmetto* (Lec., Chapman).
Marasmalus ventilator Grote. Rhus typhina.
" *histrio* Grote. Rhus
Deva purpurigera Walk. nutum.
Plusia Putnami Grote. c.
Plusia monodon Grote. us.
Pyrrhia exprimens Walk. a.
Catocala relicta Walk. Populus.
" *Briseis* Edw. Salix.
" *habilis* Gr. Juglans.
Panopoda carneicosta Guen. Quercus.
" *rufimargo* Hübn. Quercus, lia.
Homoptera minerea Guen. Salix.

TEN NEW SPECIES OF ORTHOPTERA FROM NEBRASKA—NOTES ON HABITS, WING VARIATION, ETC.

BY LAWRENCE BRUNER, LINCOLN, NEBRASKA.

A trifle more than two years ago the writer first entertained the idea of preparing a synopsis of the Orthoptera of Nebraska, with the intention of publishing it as a special bulletin from the Agricultural Experiment Station. With that end in view, work was immediately begun; and in the course of a few months the greater portion of the manuscript was ready for the printer. At this time other matters that were considered of more immediate importance came up at the Station, and that of the Orthoptera was laid aside. It has now been lying nearly two years.

As the result of special collecting and study on the order for the past eighteen years within the State, my collection contains 241 species that have been taken within its boundary. Among these there are about two dozen species that appear to be new to the science of entomology. From among these apparently new things, the following are selected for publication at this time:

GRYLLIDÆ.

Cycloptilus borealis n. sp.—Head and pronotum of both sexes, together with the two basal abdominal segments of the female, light mahogany brown above; abdomen dark brown inclining to black on the dorsum which is more or less densely covered with silvery grey scales, giving the insect a grizzled appearance. Tibiæ and apical portion of the femora indistinctly fasciate with brown. Underside and basal portion of the legs pale yellowish.

Moderately robust, fusiform; the middle pair of legs rather small; posterior femora not very much inflated. Anal cerci of the female a little more than half as long as the body, quite stout and somewhat hairy; those of the male shorter and slenderer; those of the female directed backward, those of the male considerably divergent.

Length of body, ♂ and ♀, 7.5-8 mm.; of pronotum, ♂, 2.15 mm.; ♀, 1.85 mm.; of antennæ, ♂ and ♀, about 10 mm.; of hind femora, ♂, 3.5 mm.; ♀, 4 mm.; of anal cerci, ♂, 3 mm.; ♀, 4.1 mm.; of ovipositor, 4 mm.

This active little cricket was first taken by me on the 10th of August, 1888, at Valentine, near the Niobrara river. It was found among dead grass upon sandy soil on a south hill-slope. It was again met with on the margins of the large salt basin west of Lincoln on the 15th of the following month. These latter specimens were under boards lying upon sandy soil. Judging from the fact that all the specimens thus far taken have been found upon sandy soil, it will be safe to call it a frequenter of sand districts, where it may be looked for under boards, loose stones, sticks and loose *debris* of all kinds during daytime.

Tow other representatives of the genus have been described from North American localities, *i. e.*, *Cycloptilus squamosus* Scudder, a Texan species, and *Cycl. Americanus* Saussure, a Cuban species.

LOCUSTIDÆ.

Ceuthophilus pallescens n. sp.—This wingless cricket is very similar in appearance to *C. pallidus* Thos., but differs from that species in its markings and in the number and arrangement of the femoral and tibial spines. In size it is similar to *C. maculatus*, than which it is slightly less arched.

A moderately long legged species in which the spines are arranged as follows: Anterior femora with two spines beneath internally; the middle, with about four pairs and an outer apical one; posterior femora with both the inner and outer carinæ of the lower edge very thickly set with minute teeth-like spines, the inner row doubled near the middle. Posterior tibiæ furnished with five spines on each edge, somewhat alternately arranged and with the intermediat h teeth-like shorter ones; the lower edge is also supplie -apical and two apical spines only a little less prominent , re. Middle and anterior tibiæ with three pairs of spines e r side. Antennæ moderately long. Eyes of medium size.

General color very pale s The middle and hind thoracic segments, together with the firs , marked above with a narrow transverse black patch each. iese there is drawn a narrow dorsal line that severs them into ate halves. Eyes shining black. Spines of legs tipped with brown. In addition to the usual spines this insect is characterized by the presence of numerous smaller, almost microscopical spines that are scattered over the general surface of the femora and tibiæ. These latter are entirely brown.

Length of body, ♀, 19 mm.; of antennæ, 30 mm.; of hind femora, 12.5 mm.; of hind tibiæ, 14 mm.; of ovipositor, 12.25 mm.

Described from one female and one immature male.

Habitat.—Dawes and Sioux counties in northwestern Nebraska. The female specimen was taken in a shallow well 17 miles north of Harrison. The male was found under a timber at the tunnel on the line of the Burlington & Missouri R. R., south of Crawford, in Dawes Co.

Udeopsylla compacta n. sp.—About the size of *Daihinia** *brevipes* Hald., to which it bears a very striking resemblance; but is darker coloured than that insect, and at once distinguishable from it in having the tarsi of anterior and posterior legs four-jointed instead of only three-jointed. The posterior femora of this insect also lack the heavy spines that are so characteristic of the other.

Legs short and heavy, the posterior femora in the male very similar to those of the female, very minutely spined below; the posterior tibiæ not

*The genus *Daihinia* is based on the abnormal number of tarsal joints in the anterior and posterior feet, where there are three instead of four. Haldemann's type was not an unique in that respect. I have fully a dozen specimens all of the typical form.

bowed, strongly spined above and below. Antennæ heavy, about as long as the body.

Length of body, ♂ and ♀, 22 mm.; of antennæ, about 24 mm.; of posterior femora, ♂ and ♀, 12.5-14 mm.; of hind tibiæ, ♂ and ♀, 16 mm.

This hitherto undescribed cricket is a native of the sandy districts of Nebraska, Dakota and Kansas; and like the *Daihinia brevipes* Hald., to which it has been compared, also burrows into the sand. So closely do these two insects resemble each other at a cursory glance that I did not distinguish their difference until about to label them for cabinet specimens. It is to be distinguished from *Udeopsylla robusta* and *nigra* by the greater size of its pronotum, also by its less glossy appearance. In colour it is a pitch-brown above and paler beneath.

There is still another species of these large, wingless "sand crickets" to be occasionally met with here in the West. It is the insect that I have called *Udeopsylla gigantea.** As that characterization was very brief, the following description is herewith presented:—

Very dark brown, almost black, with an interrupted dorsal line and a few mottlings of a lighter shade. The posterior femora are very heavy and clumsy in the male, reaching more than half their length beyond the extremity of the body, furnished below with a row of nine short strong spines; posterior tibiæ three-sided, more strongly bowed than usual, and furnished above with two rows each of four spines which alternate, and between these smaller ones; the lower side also spined on apical half. Legs of female less inflated and not so strongly spined.

Length of body, ♂, 30 mm.; ♀, 26 mm.; of antennæ, ♂ and ♀, about 30 mm.; of hind femora, ♂, 24.5 mm., ♀, 17 mm.; of hind tibiæ, ♂, 25 mm., ♀, 19 mm.

This insect appears to be much scarcer than either *brevipes*, *robusta*, *nigra* or *compacta*, and is confined in its distribution to a much smaller area. It also burrows in the ground and lives solitary. It has been seen by me but once within the State, viz., in the vicinity of Lincoln, near the large salt basin. It is also to be met with in Kansas and the Indian territory—the pair upon which this description is based having been taken in Kansas.

*Bulletin of the Washburn Laboratory of Natural History, Vol. I., p. 127.

Thus far comparatively little attention has been paid to the conocephalids among the Locustidæ of North America. Especially is this true with reference to the genera *Xiphidium* and *Orchelimum*, both of which are rich in species here in Nebraska as well as in almost every other State of the Union. When I undertook to work over the specimens of these insects in my collection, it was but a very short time before the discovery was made of a number [illegible] Some of the most striking of these are now described.

[illegible])

PHRAGMATO[illegible]AR[illegible]SA HARRIS.

There is no doubt but that [illegible]imens which go by the above name are referable to the European [illegible]*iginosa* Linn.

Prof. Smith has noticed their super[illegible] resemblance* which amounts to identity. I have compared examples from France with a series from New York and I can find no difference in ornamentation. Neither do they differ structurally. The venation is identical.† The genitalia of the male also are the same within the limits of variation of the species, which appear to be wide. In the specimen from Europe examined the supra-anal plate is elongate-triangular, produced to a point, concave below, slightly curved down and bulging a little laterally at the base. The side pieces are very long and narrow, gradually tapering and curved inwards. They are strongly concave on the inside, the sides being almost curved over, with a short, sharp projection above and below at a little more than half their length. Of *rubricosa* three specimens were examined. In two the anal plate was aborted, being represented only by a short, square piece; in the third it was present, of the same shape as in the specimen of *fuliginosa*, but a little narrower. The side pieces also varied. In the first and third specimens their edges were so much incurved that the two points came together and were united in one piece; in the other specimen they were as in *fuliginosa*, perhaps even a little less incurved.

From the above it will be seen that *rubricosa* cannot stand as a distinct species.

HARRISON G. DYAR, New York.

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*CAN. ENT., XXII., 120.

†My specimens differ from Prof. Smith's figure on page 235 (fig. 8) in that the second subcostal venule branches off before the fifth, while in the figure the reverse is the case. This is so in both European and American examples.

AELLOPOS TITAN.

Mr. Lyman's interesting note on the occurrence of *Lepisesia flavofasciata* reminded me that the Society has in its possession a very rare moth, *Aellopos titan* Cram., and possibly the only Canadian specimen in the country. It was obtained by the Society with the Pettit collection; and Mr. Pettit told me that a neighbour's boy at Grimsby brought it to him alive one morning in his closed hands, and asked if it was of any use to him. Prof. Fernald, in his "Sphingidæ of New England," says it is unknown to him, but is said to occur rarely in the southern part of New England Mr. Grote does not mention it in his "Hawk Moths of North America," but gives it in his Check List of 1882 as a N. A. species, and in the CAN. ENT. for July, 1886, speaks of it as belonging to the colony of West Indian moths in Florida, some of which at times invade New England.

For the benefit of any of your readers that may be fortunate in securing a specimen I transcribe Prof. Fernald's description:—

"Expanse of wings, two inches and three-tenths. Dull blackish with a slight olivaceous tinge; discal spot black and scarcely visible; a straight, semi-transparent, whitish band crosses the middle of the forewing, followed by another which is much narrower. A somewhat arcuated, similarly coloured band formed of a double series of semi-vitreous, lunate spots extends from the costa nearly across the wing. The terminal space is paler and has purplish reflections. The underside is dark brownish, and the whitish markings of the upper side are distinctly reproduced. The hind wings are blackish, paler at the base and shaded with yellowish along the costa. Head and thorax above, dull brownish with a slight olivaceous tinge. Abdomen olivaceous, with the third abdominal segment white above; fourth segment with a large dark brownish lateral shade which is much reduced on the fifth, but extends entirely across the sixth. Anal hairs, brown on the sides and olivaceous in the middle."

That description applies well to the specimen before me, with the exception that the straight whitish band does not quite cross the middle of the forewings, terminating before reaching the costa, and the black discal spot is quite distinct. Our specimen is fresh, and in excellent condition, its only defect being the absence of part of the anal tuft on one side.

J. ALSTON MOFFAT, Curator.

LEPISESIA FLAVO-FASCIATA.

The notice of the capture of *Lepisesia Flavo-fasciata* in Canada reminds me that I had omitted recording its occurrence in Colorado. I have taken it there near South Park, above 10,000 ft. elevation. The larva feeds on Epilobium in July and August, and varies from greenish-yellow to brown; when young it has a yellowish caudal horn which it loses when half grown) and it then presents a shining black "button" like tha *bbottii*. When full grown the larva is of a dirty olive br darker mottlings and fine longitudinal lines. It pupates u hout making a cocoon or entering the earth. The moth fl Colorado (but I had one emerge last March from a pupa th ept in a cool room all winter). This species is partial to the species of Ribes, flying swiftly from one bush to another, and have all the habits of the two small species of *Hemaris* that e same locality. The larva of *Alypia Lorquinii* is also abundan ilobium at the same time, and I was collecting it when I discovered the larva of *L. Flavo-fasciata*.

DAVID BRUCE, Brockport, Monroe Co., N. Y.

SCENT-GLANDS IN THE LARVA OF LIMACODES.

Described from four larvæ found on Liquidambar, Oct. 18. When disturbed the larva has the power of emitting drops of clear liquid from pores along the edges of the back, this liquid having an odour similar to that of crushed Liquidambar leaves. These pores are sixteen in number, situated along the edges of the back, their location being indicated by darker green spots just below the edge; between the seventh and eighth pairs of pores on each side is a white spot, and behind the eighth a white dot.

The back varies from entirely brown, excepting the anterior border, to having the anterior fourth, a median stripe from it, and an irregular spot behind the middle, green. The side is green with more or less brown beneath.

The larva is inverted boat-shaped or casket-shaped, obtusely truncate anteriorly and prolonged into a short tail posteriorly; hump-backed. At the median angle on each upper edge is a prominence on each side, behind which and separated from it by the fifth pair of pores is a smaller

prominence. The prothorax is free from the "casket" and retractile; its spiracle on the posterior border; eight pairs of spiracles are visible on the sides of the "casket." The "subjoint" is situated beneath and is retractile.

W. HAMPTON PATTON, Hartford, Conn.

A CORRECTION.

A curious error occurred in the catalogue of *Arctiidæ* in the last volume of the CAN. ENT., pp. 167 and 168. Under *Euchaetes egle* I placed as synonyms *Tanada antica* Wlk., and *Arctia sciurus* Bdv. In some way they have attained specific rank in the paper as it stands. They should be indented as synonyms, without the preceding generic abbreviation.

A similar error occurred under *Hyphantria*, pp. 163-165, where *punctatissima*, *congrua*, *punctata*, *textor* and *candida* all stand as species instead of synonyms as was intended. In both cases the error is apparent if the bibliography is consulted carefully; but I deem it better to call attention to it so that the correction may be made in the volume.

J. B. SMITH.

CORRESPONDENCE.

ARCTIIDÆ OF NORTH AMERICA.

Dear Sir: Kindly insert the following synonymical note. On page 231 of Vol. XXII. Prof. Smith refers to *Halisidota trigona* Grt. I would correct this to read as follows:—

Halisidota specularis Her.-Sch.

1854—H.-S., Saml, neuer oder wenig bek, ausser. Schmett., page 72, fig. 59, *Trichromia.*

trigona Grt.

1879—Grt., No. Am. Ent., 46, *Halisidota.*

1881—Grt., Trans. Kansas Ac. Sci., VII., 64.

Habitat—Colorado, New Mexico, Brazil.

I have compared Mr. Grote's description with Dr. Herrich-Schäfer's figure, and there is no doubt but that the two refer to the same insect.

HARRISON G. DYAR, New York.

BOOK NOTICE.

AMONG THE MOTHS AND BUTTERFLIES: By Julia P. Ballard. G. P. Putnam's Sons, New York, 1890; pp. 237.

This beautiful book is an enlarged and revised edition of "Insect Lives," published 1880, and contains recent studies and many additional illustrations. It treats e g butterflies, sphinges and moths from the caterpillars, an on the personal observations of the author. Without pre e of entomology, Mrs. Ballard found herself attracted by f caterpillar, and followed it up to pupa and imago, makin- veries at every step, and gaining experience day by day, a n expert in that line. Many of the species treated of, if they y is mentioned at all in books, have never been so carefi here; witness the story of the great *Leopard Moth*, the *pillar*, the *Monkey-faced Moth*, the *Beechnut Box*, the *Rosy* worm. Of many others, better known than these, are interesting notes, as *Orgyia leucostigma*, *Deilephila lineata*, *Ceratocampa regalis*. The enthusiasm of the author is contagious, and makes the reader wish that spring would hurry along. I do not know of any book—certainly there is none in America—which has attempted to enter upon the field now taken possession of by Mrs. Ballard. If any good pater, or aunt, or cousin, wishes to do a kind turn to an active boy or girl, they could not do better than put this book in the young person's hands,—at the same time a net and collecting apparatus (which our good friend John Akhurst will be happy to furnish), and bid them, when spring comes, search the fields and woods as Mrs. Ballard has done. The difference between eyes and no eyes is wonderful, and occupying the former will keep young people out of mischief, at least giving them something to do and to think of. Once let a boy put his foot over the threshold of this temple of ours and catch a glimpse of the inner mystery, and there will be no idle and wasted hours. And to this end the author of "Moths and Butterflies" has well served her generation. WM. H. EDWARDS.

*** Subscribers are respectfully reminded that their subscriptions are now due and should be paid forthwith to the Treasurer. The date to which payment has already been made will be found on the address label.

Mailed February 4th.

The Canadian Entomologist.

VOL. XXIII. LONDON, MARCH, 1891. No. 3.

REMARKS ON PROF. JOHN B. SMITH'S REVISION OF THE GENUS AGROTIS.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

To the great kindness of Prof. French I owe a copy of the Bulletin of the U. S. National Museum No 38, which contains Prof. Smith's Revision of the North American Species of *Agrotis*. In view of the fact that out of the 252 species reviewed by Prof. Smith, no less than 110 are credited to myself, besides five species "not placed," it might be reasonably supposed that I was interested to receive this publication and that I must regret not having received it before publishing my New Check List.

With regard to the classification of the group it is conducted upon the basis first suggested by myself, *i. e.*, the forms with unarmed fore tibiæ are separated, and other divisions are based upon genitalia and sexual characters. These latter, in my opinion, are not sufficient for generic distinctions in the noctuidæ, and we may thus regard the whole as forming one genus, the more so as the European species are not fully drawn into comparison. Prof. Smith is quite right in saying that I had no idea of the extent of my genus *Carneades*. I only regard as belonging to it species with tuberculated clypeus. At the time of establishing the genus upon *moerens* and *citricolor*, I had no longer the opportunity of comparing my former material. I believe there can only be a question of three genera at the expense of *Agrotis* as considered by modern authorities: one in which the anterior tibiæ are unarmed; one in which the tibiæ are all armed, both of these with smooth clypeus; the third (*Carneades* Grote) in which the front is tuberculate. I do not know that the generic term *Noctua* can be used for any of these divisions, according to the rules of zoological nomenclature, because I believe it was previously used in the Birds. For the characters to be used in separating the groups of *Agrotis*, I refer the student to my paper on the genus in the CANADIAN ENTOMOLOGIST, Vol. XV., p. 51, *et seq.* The type of the genus, as pointed out by me, is assumed by Prof. Smith to be the European *segetum*.

I referred, in my Check List, *Pachnobia* to *Agrotis* (1875), but in deference to European writers have lately left it near *Taeniocampa*.

The synonymy of the species adopted by the author is largely that previously adopted by myself. It must be held in mind that, in those years, material had not largely accumulated, and that my descriptions were often drawn up from [illegible] I am not surprised that certain forms should be now [illegible]d which I was warranted in separating at the time. In[illegible]elf expressed the opinion. In, some cases, as *A. janualis*, [illegible]done, I think the varietal term should have been kept by [illegible]lour is also a character, and my *var. atropurpurea* of *tessu*[illegible] a "pure synonym," although based upon a difference in [illegible] acknowledged to exist. It is probable that here and there som[illegible]es have been made which will need correction. Among these [illegible] *clodiana*, which I think will prove different from *vancouverensis* [illegible]ile my figure in the Illustrated Essay does not merit, I feel sure, Prof. Smith's criticism upon it. But I may pass over this, as well as other points, to notice a few which should not be passed over. That Mr. Morrison sent me specimens not in accord with his types, I have already stated. To this fact differences in my determinations may in part be due. Mr. Morrison sent me specimens of *Pachnobia carnea* from Mt. Washington labelled *scropulana* "type." I did not know *Wockei*, except from Moeschler's figure (which Prof. Smith says is really *scropulana*), nor did Mr. Morrison. But I had specimens from Mr. Moeschler labelled *Pachnobia carnea* from Labrador which were evidently the same as Mr. Morrison's "types," or so-called types, of *scropulana*. I exhibited the specimens before the American Association as well as the examples of *opipara* Morr. and *islandica* Moesch., which latter were also the same species. I am the first to suggest that *islandica* Moeschl. is not the same as *islandica* Stdgr., and, in consequence, to propose to call the American (Labrador and Mt. Washington) species *opipara* Morr. This view is taken now by Prof. Smith, who has adopted many of my views, but I am brought in by him for an incorrect identification of *islandica* which I never committed. It is I who corrected both Moeschler and Packard for improper identifications of *islandica* as an American species. The identification of these Labrador and Mount Washington species is interesting, as illustrating further the theory advocated in my paper on "The White Mountain Butterfly" of geographical distribution in the North American Lepidoptera. With regard to the erroneous determina-

tion of the European *Dahlii*, I may say that Mr. Morrison himself sent me *phyllophora* determined as *Dahlii* var. of Gueneé, and that I corrected this determination. I may say, to conclude with Mr. Morrison, that sometime after the circumstances which led to our difference transpired, Mr. Morrison wrote me a letter in which he acknowledged that he had misled me on several occasions, for the reason that he imagined I had acted in bad faith to him in sending him (at his request) species to describe, which he thought I knew not to be new. These species *were*, however, really new, and I described them, upon Mr. Morrison's refusal, myself, whereupon Mr. Morrison candidly acknowledged his suspicions, of which he relieved me, and this matter brought our correspondence to a close. With reference to the remarks on page 38, with regard to Mr. Henry Edwards's types of *Agrotis*, I would say that I returned the types of *A. niveivenosa*, *A. pallidicollis* and *A. milleri* to Mr. Edwards, and that I did so at his special request. No other "types" were "borrowed" by me, and all other specimens of *Agrotis* received by me from this source were given to me by Mr. Edwards, as a due return for my general determinations of his material in the family. I relinquished to Mr. Edwards really valuable and veritable "types" of *Aegeriadæ* in the exercise of a like courtesy, as Mr. Edwards was studying that group. Mr. Edwards's specimens of Californian *Agrotis* were, however, not "types" until worked over by me, and had little value aside from my work upon them. I gave Prof. Smith also several types of *Noctuidæ* and Mr. Neumoegen of *Arctia*. I may here remark that Prof. Smith is fond of citing specimens determined by me which are in various collections and do not belong to my species. In some few cases, as in the *exsertistigma* group, these determinations may well be the result of error on my part. But in by far the greater number of cases I believe that the determinations were not positively made by me, that in all, or nearly all, of them I never compared the specimens with my types or had the opportunity of doing so. Names given by me under a reservation would not unlikely be used by the owner of the specimen without that reservation. I think, when my types come to be examined that *A. orbis* will be shown to be distinct from *cupidissima*, and probably the species described by Prof. Smith under the latter title. But on the whole, and granting all that can be said, and while I am certainly not directly responsible for all the mistakes in the different private collections cited by Prof. Smith, which I have never had the opportunity thoroughly to see, much less to study, it must

be clear to the unprejudiced reader that I have made very few mistakes in a very difficult group, and that I have at least laid down the foundations for its proper study. With regard to Dr. Harvey's "types," the specimens belonged to me, and were described under my personal supervision, correction and direction, and Prof. Smith, in complimenting Dr. Harvey's accuracy, is unwittingly betrayed into complimenting me.

In conclusion I may [illegible]arks on species of mine "not placed" by Prof. Smith. [illegible]at *A. Fishii* Grt. is not placed, although in the list it is [illegible]ar. This is a very pretty and distinct Eastern species fr[illegible]ontour of the wings and the peculiarities of the ornamen[illegible]. *A. juncta* is a dark species, recalling in colour the com[illegible]-brown *Agrotids*, but with the stigmata fused, recalling the [illegible] group. I do not doubt its validity, nor that of *nana* [illegible]est form known to me and resembling *opaca* in appearance. [illegible]*ra insulsa* Walk. is, I say, on p. 43 of my essay, an *Agrotis*, evidently allied to *Repentis*. What does Prof. Smith mean by saying (p. 209): "Mr. Grote, whose reference of the species to *Agrotis* has been followed, gives no suggestion as to the species it most resembles or where its allies are to be found"? Again, Prof. Smith calls my *Herilis*, "herelis"; *badinodis*, "badinodes"; *insulsa*, "insula"; in all these cases I do not know why.

Finally, with regard to two species rejected from *Agrotis* by Prof. Smith, I would say that I could not determine the structure of the feet in the type of *niveivenosa* (coll. Hy. Edwards). In my New Check List I draw attention to its resemblance to *Cladocera*. I do not believe it is a *Hadena*, as Prof. Smith classes it. I can well believe that *Alaskæ* belongs to my genus *Agrotiphila*, which in my New Check List I place in the *Heliothini*. I am pleased that my recently expressed opinion that *A. hospitalis* Grt. is a valid species, distinct from *perconflua*, is confirmed by Prof. Smith.

On page 92 the author remarks: "Mr. Butler says *augur* is the type of *Graphiphora* Ochs., in which case the application of the name to the *Tæniocampa* series by Mr. Grote would be unwarranted." I reply, that I have shown that the term *Graphiphora* is not originally Ochsenheimer's but Hübner's, and that its true type is *Gothica*, Check List, 1876, p. 37. It is, therefore, strictly speaking, to be employed instead of *Tæniocampa*. As to the affinities of *Agrotis* with *Tæniocampa*

I have elsewhere explained myself. There are several other points in Prof. Smith's paper to which I could reply, or as to which I could express an adverse opinion, but I am so much gratified that a needed revision of the species of *Agrotis* has been accomplished, that my own justification or the vindication of my priority in particular instances, becomes a matter of little moment. Any errors it may contain will no doubt be rectified in the future, and in the meantime we have in it a valuable repository of our knowledge of the North American species of *Agrotis*.

ON THE POSITION OF LIMENITIS PROSERPINA, EDW.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Mr. Scudder, in Butt. N. E., argues at length in favor of considering *Proserpina* as neither more or less than a hybrid between *L. Arthemis* and *L. Ursula* (called *Astyanax**). I differ from him, holding *Proserpina* to be a dimorphic form of *Arthemis*, just as *Papilio Glaucus* is a dimorphic form of *P. Turnus*.

Astyanax is one of the resurrected names which I, with many entomologists, hold to be objectionable and not to be adopted to the exclusion of names long in use and familiar, repeatedly treated of and figured in books. In the words of the late B. D. Walsh, one might as well "tell New Yorkers to call their city New Amsterdam, or the English to have their letters addressed to Londinium, because these were the original names." Fabricius, in 1775, named the species *Astyanax*. In 1793 he renamed it *Ursula*, for the following reason: it then stood in the genus *Papilio*, in which also stood another species by name of *Astyanax*. He therefore changed the first of these to *Ursula*, and by this name the species has been known to this day—almost 100 years It is so figured by Abbott and Smith, 1797, and by Boisduval and Leconte, 1833. That Fabricius was right in changing the name to avoid a duplicate in the same genus is undoubted, and although the second *Astyanax* has since been found to be the female of something else, there is no reason for now disturbing *Ursula*. It was a common practice with the early naturalists, and especially with Linnaeus, to change a name given for another, and the change was accepted by their contemporaries In some cases we can to-day see the reason; in others we cannot, but that there was a sufficient reason at the time is not to be questioned. There was no 'priority rule" at that day. To deny that Linnaeus had the right to change one of his own names if he saw fit is a piece of impertinence. No rule of the kind spoken of was ever adopted till 1842, and that could properly have no retroactive effect. The resurrection of obsolete names has been the greatest possible nuisance during the last 20 years or since the publication of Kirby's Catalogue. Two years after the appearance of this Catalogue in 1872 1st July, as appears by the Trans Ent. Soc., London the following circular, addressed to entomologists, was laid before the Society, with signatures of most of the leading British entomologists appended:— 'ENTOMOLOGICAL NOMENCLATURE.—The undersigned considering the confusion with which entomological nomenclature is threatened (and from which it is already to no small extent suffering) by the reinstatement of forgotten names to supersede

Now what are the known facts about *Proserpina?*

1. The species *Arthemis,* black, with a broad common band of white across the disks, occupies the whole northern part of the continent, from ocean to ocean, and from the Arctic Circle to northern Massachusetts and westward to Wisconsin.

2. Along the south [illegible] range of *Arthemis, in certain localities only*, there flies, [illegible]ssociates with it, a small black form agreeing exactly wi[illegible]n outline of wings. This form may either be without a w[illegible]s the disks (*vide* Butt. N. A., 2, pl. 36, fig. 5), or it may p[illegible]stripe corresponding in position

those in universal employment, u[illegible]ogists the desirability of ignoring the names so brought forward until [illegible]ethod of dealing with them shall be settled by common agreement.

" (Signed) H. W. Bates. [illegible]. Arnold Lewis.
Alfred R. Wallace. [illegible]rederick Bond.
Wm. C. Hewitson. [illegible] Jenner Weir.
Francis P. Pascoe. [illegible] Shepherd.
T. Vernon Wollaston. Ldw. W. Janson.
John A. Power. Edw Newman.
Samuel Stevens. E T. Higgins.
Edward Sheppard. B. F. Logan.
Ferdinand Grut. J. Greene.
J. W. Dunning. Thos. H. Briggs.
Frederic Moore. W. C. Boyd.
Howard Vaughan."

And following this: "Professor Westwood stated that . . . he considered a law similar to that which limits adverse claims to real property in this country to a period of twenty years, might with equal advantage be applied in zoology."

Now, since 1872, there has been no "common agreement" by entomologists as "to the method of dealing" with these "forgotten names," and the question stands just where it stood then. Mr. Scudder, apparently, in order to get some show of authority for resurrecting dead names, has followed he says, "the rules laid down by the American Ornithologists Union"! (What have entomologists to do with the rules of American Ornithologists?) And so he displaces a large proportion of the recognized names in American lepidopterology for dead and forgotten, and what is worse, often wholly unauthenticated ones. Thus we get *Danais Plexippus* for *D. Archippus* (in his earlier writings he called it *D. Erippus*). *Limenitis Archippus* for *L. Disippus, Papilio Polyxenes* for *P. Asterias, Neonympha Eurydice* for *N Canthus* (absolutely without any right whatever), *N Phocion* for *N. Areolatus, N. Cornelius* for *N. Gemma* (both these unauthenticated), etc, etc, without end. One of the strangest changes of all is that of *Papilio Turnus* into *P Glaucus* *Turnus* has been described 119 years, and during the entire period has been known by that name alone. *Glaucus* was described 126 years ago from one sex only. It is not a species at all it is the black dimorphic female of *Turnus*, and it has no corresponding male It is scarcely twenty years since this fact was made known As a dimorphic form it needs a distinguishing name It is the practice to give such forms names. Mr. Scudder now calls the entire species *Glaucus*, but to get a name for the black female he calls it *Glaucus-Glaucus!* and there is no *Turnus* any more Is not that a precious device! I advise every lepidopterist to ignore such changes, one and all, and to adhere to the accustomed names, nearly every one of which has a full century of undisputed title.

to the outer edge of the white band of *Arthemis* (as in Butt. N. A., 1, pl. 41, figs. 1, 2). It is rarely or never solid white, of clear colour, as in *Arthemis*, but is slight and often nebulous.

3. South of the territory occupied by *Arthemis* is the black species, *Ursula*, flying to the Gulf of Mexico and at the southwest, in Arizona at least. Over a considerable belt, say perhaps of fifty to one hundred miles width, along the southern range of *Arthemis* and northern range of *Ursula*, many examples have been taken which are undisputed *Ursula*, but have more or less distinct traces of a white stripe similar to that seen in *Proserpina* (Butt. N. A., I., pl 41, figs. 3, 41, for such an example of *Ursula)*, though never so heavy as in the most strongly marked examples of *Proserpina*. South of this belt, so far as I am aware, such striped examples have not been taken. *Ursula* without modification or variation occupies many degrees of latitude. but in the southwest comes to be considerably changed and is lost in its variety *Arizonensis*.

4. I myself obtained eggs from a female *Proserpina* at Stony Clove, in the town of Hunter, in the Catskills, elevation 2,000 feet, and from these eggs raised four pupæ from which came three *Arthemis* and one *Proserpina* (this last is figured in Vol. II. before cited), so establishing the dimorphism. The relationship of the two forms had been suspected but never proved. Mr. Mead relates, CAN. ENT. VII., 162, that he obtained about 500 eggs from fifteen females *Arthemis*, and 31 eggs from a single female *Proserpina* at same time, showing the black female to be as fertile as the pied one.

5. I am thoroughly familiar with this part of the Catskills—in fact was born and bred in the town of Hunter—and for many years collected butterflies there, and I can say positively that I have never seen an example of *Ursula* there. It does not fly at all in that elevated district. On reaching the Valley of the Hudson, ten miles west from Stony Clove, *Ursula* begins to appear. Nowhere is the surface in Hunter at less than 1,700 feet, and all the highest peaks of the range are within the town limits. Between the Clove and the river valley are Round Top, High Peak, etc., and the lowest ground is the summit of the Kaaterskill Clove, elevation nearly 3,000 feet.

6. In preparing the text for *L. Arthemis* for Butt. N. A., I made careful enquiries about *Proserpina* all along the line from Maine to Wisconsin, and published the information gained. This form was rare in Maine, not common in south New Hampshire, unknown in Vermont, as also

in the Adirondacks of New York; common in middle Michigan, and in certain localities in Wisconsin. Had not been seen at Toronto, Canada, but occasionally was noticed at Hamilton. That is, along a line of 1,000 to 1,500 miles on the southern border of the range of *Arthemis*, and the northern border of the range of *Ursula*, *at a few spots only* had *Proserpina* been observed east of Michigan (to the west there is no definite information). The only *Proserpina* was known to be abundant is in the town of spoken of. All this appeared from the evidence spread . N. A.; and Mr. Scudder has been able to add nothing to it in "the Graylock Hopper" (an elevated valley in the mountains a lliamstown, Mass., *Proserpina* was "tolerably common." As to dance at Stony Clove we have the direct testimony of Mr. o also collected there year after year. Speaking of one year he says:—"When I collected every *Proserpina* I could find I took 1 , of *Arthemis* I actually did take about 200 and could have taken 1,000 without any difficulty.

7. In all the preparatory stages *Proserpina* and *Arthemis* are precisely alike, and both are specifically removed from *Ursula*. Witness the figures of the eggs, *Arthemis*, Butt. N. E., pl. 64, fig. 15; *Ursula*, fig. 12. I have Mrs. Peart's drawings of the eggs of both *Proserpina* and *Arthemis*, and they are indistinguishable. In the first two larval stages all this group are alike, but at second moult each species takes on characters of its own. Fig. 26, pl. 74, given by Mr. Scudder as *Arthemis* mature larva is copied from Trouvelot's drawing of *Proserpina* (made for me and loaned for use in the Butt. N. E.). This drawing is named on its card *Proserpina*, and of course, in giving it on his plate as *Arthemis*, Mr. Scudder was satisfied that it answered equally well for either form. I have another drawing of *Arthemis* at the same stage, made by Mrs. Peart, and all its peculiarities are shared by *Proserpina*. These are widely different from the mature stage of *Ursula*, as is plain from Mr. Scudder's figures of the latter, pl. 17, figs. 17, 21. Just so, the pupæ of *Arthemis* and *Proserpina* are alike (I have drawings of both), and differ specifically in form and colour from the pupa of *Ursula*, Butt. N. E., pl. 83, fig. 12, for *Ursula*; fig. 14 for *Arthemis*, copied from Mrs. Peart's drawing of *Proserpina*. So we have, on the one hand, the two co-forms, alike in each and all of the three earlier stages, and alike in size and shape of wings in the imago, (and Mr. Scudder allows this to be the fact, by using the drawings of larva and pupa of the co-forms interchangeably); on the other, *Ursula*, differing distinctly in the three stages,

and nearly always much larger in the imago, with differences in the shape of each wing. (As is well shown in Butt. N. E., pl. 2, *Arthemis* fig. 5, *Ursula* fig. 8.)

8. All the species of *Limenitis*, at the east, have one style of flight, and it is that which Mr. Scudder attributes particularly to *Disippus* (his *Archippus*): p. 277, "the flight is rather leisurely and sailing; it moves irregularly from place to place." Of *Arthemis*, he says, p. 300, it has "a rather short and rapid flight." Perhaps it has sometimes, but usually it has the same leisurely flight as *Disippus*. Of *Ursula*, p. 287: "Its flight is similar to that of *Disippus*, but still more *lofty and grand*, more leisurely and sweeping." *Ursula* is a very common species here at Coalburgh, and I can bear witness that there is nothing lofty or grand about its mode of flight. It darts about from place to place, from the ground to a leaf on tree, from tree to ground, haunts one locality, and once seen may be seen there regularly for days; feeds on excrement on the ground, and lingers about the spots where that is to be found. A sustained flight would be contrary to its observed habits. I should as soon expect an *Apatura* butterfly to fly long distances as a *Limenitis*. The habits of the two are very much alike.

In the argument to prove *Proserpina* to be a hybrid between *Ursula* and *Arthemis*, instead of a dimorphic form only of *Arthemis*, Mr. Scudder says:—"*Proserpina* occurs only in a very narrow belt across the eastern third of the continent, a belt which forms the southern boundary of the range of *Arthemis* and the northern of *Ursula*. It is known at so many points in this belt, *that it presumably occurs wherever Arthemis and Ursula are brought into contact*." That this is an unwarrantable assumption follows from what I have before stated. "There are but two arguments used to prove the improbability of such a relationship as is here urged: 1. To assert that *Proserpina has been found where it is probable that Ursula does not occur within at least an easy day's flight;* a distance of a few miles is of no account whatever." Is it not? Are we to suppose that *Ursula*, male, of the Hudson River Valley, is so seized with a longing for *Arthemis* female, of Stony Clove, as to transform him from a short and leisurely flyer into one "lofty and grand," to whom "the distance of a few miles is of no account whatever," and cause him to desert his own females and scale mountain ranges for other females whom he has never seen nor heard of, and of whom there cannot be a hereditary reminiscence? Or do the *Arthemis* females attract the

males *Ursula* by an emanation after the fashion of the Bombycid females, perceivable ten miles away at the very least? There ought, on any theory of attraction, to be a steady flight of *Ursula* males across the peaks, and once arrived at Stony Clove they should take up their abode there, and be seen in company with these so ardently sought females. But they are not there—never in a single instance have been seen there; and to attribute to them flight is contrary to what Mr. Scudder is fond of calling ."

On the other hand, the les and females live with the *Arthemis*, mate in both sexes n wo sexes of *Arthemis*, and the eggs of one form hatch as readily as du hose of the other. The black males mate with black females, and ed males with pied females. Black on both sides will account for the black progeny considered by Mr. Scudder as so close to *Ursula*; and the other mixtures will account for every phase of colour or marking ex ited. Mr. Scudder proceeds: "Several instances of undoubted hybridism are known in the genus." On which I remark that distinct species of other genera are also known to copulate, and it is not uncommon of *Colias*. And there are instances of species of unrelated genera, even sub-families, copulating. The late W. S. Foster, in 1889, on one of the peaks in Colorado, captured a male *Melitæa Palla* in copulation with a female *Chrysophanus Snow* and they only separated in the cyanide bottle. I have the two mounted by Mr. Foster on one pin, with his label stating the facts attached. Also he notified me of the capture at the time it was made. Mr. Bruce has twice taken pairs of *Lycænæ* of which the sexes belonged to different sub-groups in copulation. Such instances go to show that a male, not finding its own female, may seize another, even one wholly unrelated. What fierce passion possesses the males of butterflies may be seen by referring to the history of *Heliconia Charitonia*, Butt. N. A., Vol. II. But when females of a species are abundant, it does not seem very probable that a male will seek the female of another species, much less scale the Catskills to find her!

"*Proserpina* partakes of the characters of the two species mentioned . . ; it possesses, in fact, just the characters we should expect of a hybrid between these two species. It varies most towards *Ursula* where this prevails, and most towards *Arthemis* where that prevails." I have answered this in the preceding paragraph. No *Ursula* need to be called in for the solving of this puzzle.

"A careful comparison of a considerable series shows that there is no difference whatever in the genital armour of *Proserpina* and *Ursula*." We should like to have heard whether there is any difference between the armour of *Arthemis* and *Ursula*. The form *Proserpina* is undeniably related to *Arthemis*, only supposably to *Ursula*. If the genitalia, as evidence of specific value, are worth anything, then there should be no differences whatever between *Arthemis* and *Proserpina*. Therefore, if these organs in *Proserpina* are like *Ursula*, as Mr. Scudder tells us, in *Arthemis* they must also be like *Ursula*. But it is implied in the foregoing statement that this is not the case, but that *Arthemis* is unlike both *Proserpina* and *Ursula*. The preparatory stages tell a very different story, and I prefer to believe their testimony rather than that of the other.*

Why any where *Arthemis* has a co-form, or how such form has come to be, is not explainable, any more than why *Papilio Turnus* has a black female as well as a yellow one. The fact is all we know. From the Northern States to the Arctic Circle, in just the territory occupied by

*Are the genitalia valuable in determining species? I doubt it much. We do not need to examine them to prove that two species plainly distinct in the imago are really so as *Papilios Turnus* and *Philenor*. It is when the imagos are puzzling that help from any quarter would be welcomed; as in case of the *Graptas C album, Comma, Satyrus* and *Faunus*. Will they help us here? Looking at Mr. Scudder's plates, I see that what I consider natural genera, as *Colias, Argynnis, Limenitis*, etc., have each their own type of these organs. It is not to be supposed that they are cast in moulds like so many iron pots and knowing that every other organ varies, we have the right to believe that the genitalia vary also. How much is the question. In the plates the figures are not drawn to an uniform scale and the organs are differently exposed, probably drawn as they had dried. Some seem to have shrunk in the drying, others perhaps are done from green subjects, and are full and plump. But taking them as they stand: on pl. 33 all these species of *Limenitis* seem to be essentially alike, and I apprehend that the variation between them is no greater than would be found between individuals of each. So the three *Argynnids, Atlantis, Cybele* and *Aphrodite* are essentially alike. *Grapta Progne* cannot be distinguished from *G. Comma*, though they belong to different sub-groups, while *G. Faunus* differs conspicuously from *Comma*, though these two belong to the same sub-group, and can be but one remove from a common ancestor. On pl. 34 *Phyciodes Tharos* and *Batesii* are alike; and quite a lot of *Theclas*, together with *Incisalis Niphon* and *Irus*, seem all alike and nowhere specifically different. On pl. 35, the three *Colias, Interior, Philodice* and *Eurytheme*, are as like as three marrowfats. My friends why are things thus?

If the test is not infallible it is not to be trusted. If it fails anywhere it may fail often. Now, on page 329, under the head of *Grapta Interrogationis*, we read these words: "The two forms (of this species, to wit, *Fabricii* and *Umbrosa*) *differ so greatly and so constantly* from each other, not only in the colouring but in the form of the wings, *and even in the abdominal appendages* (the genitalia), *that they have been considered distinct species*"! That is, if they had not, by breeding from the egg, been proved to be one species by the evidence of the genitalia they would be considered as two! It seems to me this settles at once and for all the value of these organs as tests of species. The study of them may amuse an idle hour, the drawings of them are very pretty, but that they are of any value so far as concerns closely related species does not appear.

Arthemis, the yellow female *Turnus* alone is found. Along the southern boundary the black one appears; here and there a single individual, and having once got a foothold the black form gradually gains the mastery, and in the south alone rules. There are no yellow females of *Turnus* there.

It seems to me not improbable that *Arthemis*, of all its group, is nearest the parent species. Every character, from egg to imago, shows that all these species are [illegible]ted, and apparently not more than one remove from a co[illegible] *Arthemis* being so dominant, occupying the north, whence mo[illegible] are supposed to have come, it may even be identical with that form. Having once given rise to a black co-form, this last has gone southward and become modified in shape of imago and color, and in the southwest is itself replaced by its own variety *Arizonensis*.

That two distinct species wherever they come in contact can cross freely, and originate a permanent, intermediate and hybrid race, I do not believe. And, in the present case, the so-called hybrid race is not intermediate, but entirely on the side of one of the supposed parents, to wit, *Arthemis*, and a long way from the other, to wit, *Ursula*. Analogy shows us that it is a case of dimorphism, not hybridism.

TEN NEW SPECIES OF ORTHOPTERA FROM NEBRASKA—NOTES ON HABITS, WING VARIATION, ETC.

BY LAWRENCE BRUNER, LINCOLN, NEBRASKA.

(Continued from page 40.)

Xiphidium modestum, n. sp.—Related to *X. saltans* Scudd. and *X. strictum* Scudd., from both of which species it differs in its smaller size, slenderer form and in colour.

Vertex or cone of the head not quite so broad and shorter than in *saltans*, its closest ally; pronotum with the sides less bulging, and not reaching as low as in that species. Tegmina very short, only about one-third as long as the abdomen, with the shrilling organ of the male narrower and a little further removed from the base of the wing than in its allies. Posterior femora quite slender, of moderate length. Tip of male abdomen but slightly enlarged, the cerci elongate, tapering, a little curved outward and furnished with a rather long sub basal tooth. Ovi-

positor about as long as the body, quite slender and tapering, with a gentle upward curve.

Dull testaceous, sometimes with a very faint greenish tinge, the usual markings of the genus deep chocolate-brown and well defined.

Length of body, ♂, 10.5 mm., ♀, 11 mm.; of antennæ, ♂, 30 mm., ♀, 40 mm.; of tegmina, ♂, 3.25 mm., ♀, 2.75 mm; of hind femora, ♂, 9 mm., ♀, 10 mm; of ovipositor, 11.75 mm.

This modestly coloured little grasshopper is very plentiful upon uplands throughout eastern and middle Nebraska, where it is to be met with among the short grasses in company with *saltans* and *strictum*. While long-winged forms of both of its near allies are quite common, no specimen of *modestum* has been taken to my knowledge, save of the typical form. This insect also occurs in middle Kansas, Western Iowa and South Dakota.

Xiphidium attenuatum Scudd.—Generally dull testaceous with the usual brown markings of the genus, in some specimens tinged with greenish Tegmina and wings either abbreviated or fully developed—when the former, about reaching, and when the latter, considerably surpassing the tip of the abdomen in both sexes. Antennæ very long and slender. Ovipositor long, slender, straight or but very gently curved, the apex very acuminate.

Apex between the eyes rather narrow, with the sides abrupt and sharp, the cone but little rounded, not expanding, obliquely docked. Face nearly straight, oblique as in *X. strictum* to which it bears the closest general resemblance. Head and pronotum a little shorter than in that species. Abdomen tapering but slightly posteriorly, with the base of the ovipositor only a trifle enlarged. Posterior femora heavy on their basal two-fifths, slender beyond; the tibiæ also quite slender. Tip of male abdomen a little enlarged, the cerci long, broad and but gently tapering apically, the basal tooth minute, slender.

Length of body, ♂, 12 mm., ♀, 15 mm; of antennæ, ♂, 55 mm, ♀, 60 mm.; of pronotum, ♂, 2.60 mm., ♀, 3.3 mm.; of tegmina, short form, ♂, 8.5 mm, ♀, 9 mm.; of long form, ♂ and ♀, 19 mm.; of hind femora, ♂, 12 mm., ♀, 14 mm; of ovipositor, 22–29 mm.

This beautiful species is quite common at West Point, Nebraska, along the lakes and old river beds of the Elkhorn river, where it is found among

a rank grass growing near the water's edge and on very damp meadows. The females insert their slender ovipositors and lay their eggs between the blades and stem. It is very active in its movements, and when disturbed easily eludes pursuit by creeping down among the dense mass of grass.

Xiphidium nigropleu[illegible] n. sp. In its general structure very similar to the preceding, but wit[illegible]ovipositor. Bright transparent green, with eyes, stripe ot[illegible]nd the sides of the abdomen shining black.

This meadow grasshopper m[illegible]ely robust species, with narrow vertex, short occiput, large [illegible] broad pronotum and strongly veined tegmina which in the male [illegible]urnished with a large shrilling organ. The tegmina are usually abb[illegible]ed, reaching only four-fifths the length of the abdomen; but an oc[illegible]l specimen is to be found in which the wings are fully developed and [illegible]en reach to the extremity of the ovipositor in the females. Ovipositor straight, quite broad and heavy, about as long as the body. Male cerci of medium length, rather stout, tapering gently towards the apex, and with a strong sub-basal tooth. Antennæ long and slender.

General colour bright transparent-green, with the markings on the occiput, pronotum and abdomen bordered with yellowish-white which contrasts strongly with the other colours, which character taken together with the vitreous or glassy appearance of the entire surface, render this insect quite conspicuous among the members of the genus.

Length of body, ♂, 13.5 mm., ♀, 15 mm.; of antennæ about, ♂, 43 mm., ♀, 50 mm.; of pronotum ♂, 3 mm., ♀, 3 6 mm.; of tegmina ♂, 9 mm., ♀, 8 mm, short, 19 mm., long; of hind femora, ♂, 13 mm., ♀, 15 mm.

This beautiful insect, which is our most active species of the genus, is quite plentiful among the rank vegetation on low, moist grounds, and is especially common in wet places where the "cut grass" (*Leesia oryzoides*) grows. The supposition is that this grass offers a better place than usual for the deposition of its eggs which, like those of the "lance-tailed" meadow 'hopper, are deposited between the leaves and stems of grasses. Grape vines and other creeping plants which form matted clusters that afford shelter from the noonday sun and the bright light of day are

favorite haunts for this and other species of our nocturnal grasshoppers and a few of the arboreal crickets.

The "black-sided grasshopper" is found throughout the eastern half of the State along all of the streams, the banks of which are lined with shrubs and trees. Whether or not it is to be found beyond the region of "forests," I am not prepared to say at present. In a collecting trip taken during the summer and fall of 1888, for the purpose of ascertaining the approximate range of various species of our Nebraska orthoptera, this species was not seen west of Antelope County, on the upper Elkhorn river.

While speaking of the members of the genera *Xiphidium* and *Orchelimum* it might be well to record a few notes relative to their variation in wing-length and habits. Undoubtedly everyone who has had occasion to examine any of our common species of these grasshoppers, has noticed that wing-length was a character not to be relied upon as specific or even varietal difference. A very little examination will at once suffice to show this. So far I have long and short winged specimens of the following species in my collection:—*Xiphidium brevipenne*, *ensiferum*, *saltans*, *strictum*, *lanceolatum* and *nigropleurum*. Of *X fasciatum* I have only long-winged, and of *nemorale* and *ictum* I have only those with short wings. *X. gossypii* is not definitely known to me, and therefore it is not possible for me to venture any remarks upon its wing characters. Many of these insects are quite active fliers and are often attracted after night to bright lights. All of the long-winged forms mentioned above have been taken by me in such locations. That they often fly to great distances is evident, from the fact that both the *lanceolatum* and *nigropleurum*, described in this paper, have been captured at the electric lights in cities at points upwards of a mile from their natural haunts.

The various species of *Orchelimum* also vary somewhat in wing-length; but in no case, so far as I am aware, is the variation so great as in the insects alluded to above. These too are attracted by lights; and it is often the case that the best things are captured here.

Among our grasshoppers of the genus *Orchelimum* I find several forms that do not appear to have been characterized. Of these two of the most interesting will be described.

(To be continued.)

NOTES ON COLEOPTERA—NO. 7.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Philonthus quediinus Horn. A male specimen of this fine species was taken here. As the anterior marginal puncture of the thorax is placed so unusually far behind the margin, and on a line with the three discal ones, the discal [illegible] arently four. In this specimen the singular bunch of br[illegible] timate ventral segment consists of about six, all differing [illegible] ising from a small median pit resembling somewhat that seen in th[illegible] of some species of *Dermestes*. The female was not found, and to distinguish it from those of *pallidatus*, var. *rufulus* Fauv., *fusiformis*, *fulvipes* v. *occidentalis*, the number of the thoracic punctures, very sparsely and finely punctured elytra, and quedius like aspect, would chiefly have to be depended on. Previous recorded occurrence: Detroit, Mich.; Kansas.

Xantholinus sanguinipennis Lec. This species is very common and abundant on Brigantine Beach and at Atlantic City under trash from the Bay. It is very easily confused with *X cephalus*, which occurs with it more sparingly and is similarly coloured; the elytra are however of a clearer red without any tendency to become infuscate as in the latter; the dorsal and lateral series of punctures of the thorax are more numerous, coarser and constant, being exceedingly fine and some of them often obsolete in the latter. The separation of the upper and lower marginal lines of the thorax in the former species and their union anteriorly in the latter is not a character of easy observation in the hurry of collecting. *Sanguinipennis* will probably be found to be a littoral species. *Cephalus* occurs here, but always under bark, and I can see no difference between these examples and such as are taken under rubbish on the coast.

Canthon lævis Drury. Since Mr. Blanchard's very clear statement of the differences between this and *chalcites* Hald. (Tr. Am. Ent. Soc., XII., 164), it might be supposed these species would seldom be confused; the case is, however, different, probably owing to this exposition not being generally in the hands of collectors, and the great similarity of the more abundant colour forms of both species which renders tradition useless. In northern collections *lævis* is always correctly named. It is distributed from Maine to Mexico and California; in Canada, the New England and Middle States its usual colour is coppery black or brown, but south and west it varies from this to black, blue and green through all shades.

Chalcites seems to be much less common and abundant, being found in the Southern States north to Virginia, and westward to Texas, Missouri, Illinois, Nebraska and Kansas. Its colour is usually coppery, like the bronze form of *lævis*, which seems to be confounded with it by some of the western collectors, and sent as that species to their correspondents, while the name *lævis* is applied to all individuals otherwise coloured. This at least is my experience. However close the species may approach in colour and sculpture they may be infallibly separated by the smooth or granulated pygidium; that of *lævis* being always more or less granulated, and that of *chalcites* entirely smooth and without polish.

Aphodius explanatus Lec. The species was described by Dr. Leconte from a female unique taken in Colorado, which was redescribed by Dr. Horn in his monograph of the family. I am indebted to Mr. T. D. A. Cockerell for a male example taken by him in Custer Co., Colo., and note the following differences. The head is trituberculate with small but well developed tubercles, and with the side margins indistinctly rufous; the thorax has the side margins rufous till near base, which is not rufous, with the medial impressed line exceedingly fine and nearly reaching the apex; the first joint of the hind tarsus is equal to the two succeeding: the club of the antennæ is not darker than the stem, otherwise the descriptions of the female apply. The mesosternal carina is quite fine, and can be best seen when viewed transversely just in front of the coxæ.

Aphodius leopardus Horn. This species is taken at Sudbury, Ontario, by Mr. John D. Evans. Heretofore recorded as occurring in eastern Canada, Maine and New Hampshire. *Pompophœa Sayi* Lec. was likewise taken at Sudbury.

Microclytus gazellula Hald., *Clytus gazelluta* Hald., Trans. Am. Phil. Soc., X., 1847, p. 42; changed by Haldeman to *C. gazellula*, Proc. Am. Phil. Soc., IV., 372 (not P. Acad. Phil.); *Clytus gibbulus* Lec. Agassiz, Lake Superior, 1850, 234; *Cyrtophorus niger* Lec. Jour. Acad. Nat. Sci., Series 2, II., 29, March, 1850; *Microclytus* (genus created by Dr. Leconte), Smith, Misc. Collec., 1873, XI., 320; *Cyrtophorus gibbulus* Lec. (‡ *niger* Lec)=*microclytus gazellula* Hald. CANAD. ENT., XVI., 1884, p. 148 (Leconte and Horn).

Though not intended so by the describers, these names may be regarded as representing the colour variations that occur in this species: *gazellula*, pale-brown individuals; *gibbulus*, such as have the anterior half of the elytra ferruginous—the posterior piceous; and *niger*, such as

are entirely or nearly piceous, except the legs and antennæ. Haldeman's description is so bad that it took Drs. Leconte and Horn more than thirty years to find out that *gibbulus* was synonymous. *Gibbulus* is fairly described; *niger* could not well be known had not the describer himself made the synonymy. It would appear from the Jour. Acad., l. c., that he intended to cite *gibbulus* from Agassiz, Lake Sup., but by a slip of the memory wrote *niger*, her cited above which seems a rather doubtful use of the e in writing the description he evidently had a different e before him than that from which he described *gibbulus*. T sp , though distributed from the Lake Superior Region and Canada sout d to Virginia is not commonly taken, though it might be were its habits more generally known. Its biological record, so far as I know, is as follows: Mr. Blanchard dug a specimen from the bark of a living white oak quite late in October, CAN. ENT., VII., 97. Messrs. Reinecke and Zesch dug four specimens from bark on oak trees, May 6th, 1883, Bul. Brook. Ent. Soc., VI., 36, and remark their longevity. Mr. Harrington took at Ottawa, Canada, three examples on hickory and on sumac flowers in July, CAN. ENT., XVI., 73.

To this record I may add that I took here a male on plum blossoms about the first of April.

Prof. Jerome Schmitt, of St. Vincent College, Westmoreland Co., Pa., took six females early in the season (a set of which, through his kindness, now grace my collection), a history of which I am permitted to publish, which I think best to do in his own words: "They were crawling when observed on a smooth place on a living oak, elsewhere covered with rough, thick bark. Unlike most Cerambycids it is very slow and staid in its movements, and difficult to see because of its resembling the bark very much by its colours and its persistent hiding in the galleries of the bark made by some larvæ, or abandoned by a small myrmecid—*Leptothorax longispinosus*." Prof. Schmitt also writes of having seen this species several years previously on a green oak trunk under similar circumstances, and thinks it very probably breeds in the rough bark. These examples and that taken by myself were of the *niger* colour. Mr. Reinecke has sent me a female and male *gibbulus* which so resembles the common form of *Cyrtophorus verrucosus* as to require a close look to distinguish.

The above records appear to warrant these deductions:—

1st. The species breeds in the rough bark of oak.

2nd. Some individuals develop before winter, hibernating as beetles without leaving the bark, coming forth in early spring; others hibernate as pupæ or larvæ, changing to beetles later in the season.

3rd. That the beetles may be obtained from October to June by judiciously chopping the bark.

The characters separating *Cyrtophorus* and *Microclytus* were originally feeble, and have recently become more so by some one (the record has escaped me) discovering that the relative length of the antennal joints in the male of the latter are the same as in the former, thus leaving in the males only the presence or absence of a small spine at the end of the third joint of the antennæ as diagnostic. This discovery was made subsequent to Mr. Leng's synopsis of this genus in Entomol. Americana, III., 23.

Anthophilax malachiticus Hald. This species occurs here rarely, and my specimens, male and female, I owe to the kindness of Professor Schmitt, of St Vincent, who takes it on chestnut blossoms. The male and female differ in form and perhaps in colour, though the scarcity of examples renders this uncertain. The male is the more elongate, with elytra suddenly narrowed behind the prominent humeri, then scarcely perceptibly so to near tip, which is rounded. In the example before me the head and thorax are bright coppery bronze, the elytra lustrous dark greenish, the underside greenish and bluish black, the legs are rufous with the knees, tibiæ and tarsi more or less infuscate. The female is broader, the elytra not so much narrowed behind the humeri and nearly parallel behind the constriction; the head, thorax and elytra are "splendent green"; the underside is darker and obscured by the vestiture, the legs are coloured as in the male; both sexes have the last ventral segment broadly rounded, and the head, thorax and underside clothed with fine, soft, whitish hairs, longer and sparser on the thorax. The male belonging to *malachiticus* has not, so far as I know, been described, and the above from only the single individual before me is not likely to apply to all others. A series from different parts of the country, from what occurs in other similarly coloured species, may be expected to yield specimens in both sexes varying from coppery bronze to green, blue or violet, and with legs from black to rufous. *Stenura cyanea* Hald. from Lake Superior seems to be only a greenish blue example, and *A. viridis* Lec. from the same region with the legs black, though the base of the tibiæ is rufous, merely a colour variation. These

forms are likely to be eventually united. Prof. Schmitt has likewise examples of *A. viridis* and of *A. attenuatus* Hald. taken in Elk Co., Pa. *A. malachiticus* is reported to be taken in this vicinity by an amateur, who keeps the locality secret, but I have seen none of his insects.

O. Psenocerus (*Clytus*) *Supernotatus* Say, Lec. Ed. II., 200; *pini* † Lec., Jour. Acad. Nat. Sci. Phil. Ser. 2, II., 158. On a former occasion (CAN. ENT. XVI., 36) me[illegible]f having taken three examples of this species hibernating [illegible] *Cecropia* cocoon. December 9th I found a good sized nest of a [illegible]sh paper wasp in a clump of briar bushes, from which I took five of th[illegible]se beetles while examining its structure; they were stowed away quite snugly between the overlapping layers of paper and doubtlessly would have passed the winter in comparative comfort. Hibernation, while perhaps an exceptional habit of this species, would seem to be of not infrequent occurrence. The beetle is found on currant, gooseberry, wild and cultivated; wild grape, Virginia creeper, etc., abundantly from June onward; the larvæ live in the diseased or dead limbs of these and hibernate in various stages of their growth, developing during the summer. Mr. A. Fitch named it the "currant borer" and gave a detailed account of it in Rep. III., 98-105, but I have observed no mention of it recently by economic entomologists.

Chromatia (*Cistela*) *Amœna* Say. This species was described by Mr. Say from specimens taken west of the Mississippi, and appears to be rare. An insect assigned to this name, occurs sparingly along the western slope of the Alleghanies from Virginia to New York and Canada, though it is scarcely recognizable by Say's description, which must have been made from very differently coloured specimens with the head and palpi, the elytra and feet, black—the rest sanguineous. The eastern examples have the head piceous black with the clypeus and mouth parts rufous, except the last joint of maxillary palpus, black; thorax and all the under side rufous; elytra brownish or piceous black, with the suture and first interval, epipleura, margin and external interval, rufous As stated by Say, the striæ are closely, minutely punctured and the intervals finely transversely rugose.

This species I have through the kindness of Prof. Schmitt, who takes many good things at St. Vincent, rarely occurring here, though distant less than 40 miles. He allows me to say that he took in July large numbers of *Ptomophagus parasitus* from an ant's nest he was investigating, and in which at the depth of two and a-half feet he found a chipmunk's

nest under a root stored with grain and swarming with a small beetle like *Typhæa fumata*, but which on examination proves to be a species of *Cryptophagus*, probably undescribed. To his industry in this direction is due the honor of the discovery of a strange blind *Pselaphide* beetle living with ants (*Amplyopone pallipes*), recently described by Dr. E. Brendel under the name *Amplyoponica*, and for which he has created the genus *Anops*, Bull. Lab. Nat. Hist. St. Univers., Iowa II., 80.

Micracis suturalis and *aculeata* Lec. These species were bred together from hickory limbs deadened two years—the latter in great abundance, the former sparingly. I was unable to ascertain whether the larvæ live under the bark in the sap wood, or bore more deeply from the first. I could discover no galleries other than of *Chramesus icoriæ*. The beetles came forth from the middle of May till the first of July. The species resemble each other greatly, and while extremes may be readily separated by the difference in the striation of the elytra and pubescence, yet individuals meet closely and are liable to be confounded. In general, *Suturalis* is the more slender and elongated, has the elytra smoother, less deeply striate and the pubescence more visible towards the apex,—sometimes wanting, sometimes extending forward nearly as in *aculeata* in which the hairs are claviform. They are about the same lengths, .10 inch, though the latter being thicker appears the shorter. In both the basal joint of the antennæ is flattened, triangular, and in the male the anterior margin and apex have a dense fringe of very long, pale yellowish hair of peculiar structure. Each hair seems to have a central rachis from which springs rows of long spiculæ which project forward, each of which in turn becomes the rachis of smaller spiculæ. These hairs when viewed under the low powers of a microscope are beautiful objects, appearing as if composed of glass; each basal joint has from 25 to 40 as near as can be counted. When at rest the edge of the joint bearing them projects in front giving the insect a formidable appearance. Were *aculeata* with these strange appendages and clavate bristles magnified to the size of an ox, it would be difficult to delineate an animal of more ferocious aspect. Inhabiting, as they seem to do, the smaller limbs of dead trees, in an economic sense they can scarcely be classed as injurious.

The observed records of distribution are few, owing most probably not to a scarcity of the insects, so much, as to their being neglected by collectors, like many of the other species of *Scolytidæ*.

Suturalis is recorded from Illinois (boring in xanthoxylon twigs), Michigan, Kansas, Louisiana. *Aculeata*, from Virginia, Buffalo, N.Y.

NOTES.

CANADIAN RHYNCOPHORA.

In reference to Mr. Harrington's remarks on *Rhynchites bicolor*, I may say that it has been taken at Hamilton regularly for quite a number of years, never very plentiful but not considered rare. I always obtained my specimens when bea[illegible] oak and hickory. There are wild rose bushes in that [illegible]o not remember ever beating a rose bush; if I had know[illegible] have found it more abundantly. Of *Attelabus rhois* I took two [illegible] once in the neighborhood of Hamilton; but on a visit to Br[illegible]tween the 13th and 30th of July, 1883, I took it in quantities. There was a neglected field of about five acres, overgrown with hazel, alongside of a bit of woods, and there at that time was to be seen in surprising profusion a great variety of choice Chrysomelidæ and weevils. I had got my previous specimens named by Mr. Reineke, of Buffalo, who gave me the impression that it was rare and valuable for exchange, so I took a lot with the result that even now there are about three dozen of them yet in reserve. J. ALSTON MOFFAT.

APHIDIVOROUS HABITS OF FENISECA TARQUINIUS (FABR.) GROTE.

The observation of Mr. Th. Pergande in the fall of 1885, as recorded by Prof. C. V. Riley in Am. Nat., June, 1886, p. 557, is the earliest published account of a carnivorous habit in a butterfly larva, that of *Feniseca Tarquinius* (Fabr.) Grote.

Some observations made by me a number of years earlier on this insect may yet be of interest, as I distinctly saw these larvæ eating the plant lice upon alder in the autumn of 1869, and bred the butterfly the succeeding May, and was thus the first to discover the apidivorous habit in a butterfly caterpillar. A number of the larvæ were concealed among the woolly herds of plant lice on the stem of an alder near the ground, being completely enveloped in the filaments of the waxy "wool" they might easily have been mistaken for some large Coccinellid. Within a few days they changed to chrysalids of a Lycænid type, from which emerged, on the 14th of May following, this rare butterfly.

In this observation is found a probable explanation of Abbott's description of the larva of this butterfly, as given by Mr. Scudder in the CAN. ENT., May, 1872, Vol. IV., p. 85: "Feeds on Indian Arrow-wood and alder; it is partly covered with a white loose down." That the larva

is hairy is almost certain, but what the "white loose down" can be, unless the waxen wool of the plant-louse,* is difficult to determine.

In Psyche, Vol. IV., p. 75, August, 1883, Prof. J. A. Lintner records the capture of *F. Tarquinius* on May 25, 1878, by Mr. O. von Meske, and mentions this as indicating *two* broods of this species, the second appearing in August. My rearing the butterfly proves this to be the case, and shows that the insect hibernates in the chrysalis. The tropical butterfly, *Characias*, has, I believe, been found to be carnivorous.

W. HAMPTON PATTON, Hartford, Conn.

A CORRECTION.

The larvæ described by me in Vol. VI., page 209, of Entomologica Americana, are *Heterocampa biundata* Walk. and not *Heterocampa subrotata* Harvey as there designated. I have discovered this error on a recent visit to Dr. Packard, where I had the opportunity of comparing the moths with a specimen that Dr. Packard had compared with Walker's types in the British Museum. I was unable to get this correction into Ent. Amer., as the publication of that periodical has ceased.

HARRISON G. DYAR.

BOOK NOTICE.

BIBLIOGRAPHICAL CATALOGUE OF THE DESCRIBED TRANSFORMATIONS OF NORTH AMERICAN LEPIDOPTERA; being Bulletin No. 35 of the United States National Museum, by Henry Edwards, 1889.

This work, issued by the Smithsonian Institution, is one of very great value to the working lepidopterists of North America, and truly supplies a long felt want. Mr. Edwards, who has devoted so much time to the compilation of this work, is entitled to the warmest gratitude of his brother entomologists for his public-spirited labours in this connection. The work extends to 147 pages octavo, and comprises a table of the number of species in each family, of which descriptions of earlier stages are recorded in this catalogue, a list of the principal authors and publications quoted, the body of the catalogue extending from page 9 to page 137 inclusive; an appendix giving references to a few species which are not distinguishable by modern authors, and a list of some of the most valuable papers which have been published on this continent on the

*_Pemphigus tessellatus_ (Fitch).
P. tesselata Osborn, CAN. ENT., XIV., 61, (Apr., 1882).
? _P. alni_ Provancher, Nat. Can., Apr., 1890.

subject of preparatory stages, food plants, rearing and describing larvæ, etc., etc. Then follows an index to genera, and the work ends with a most useful food habit index. The general plan of the work is to give the names of all species of which any of the preparatory stages have been described, followed by the references to these descriptions in the order in which they were published, the dates of given. Upon turning to any species one can thus see what of its earlier stages have been described, and by lo erences can tell whether or not they could be supplemented wi... ... age, while the absence of any species from the list is a very sure indication that its preparatory stages are wholly undescribed. One can thus see just what has already been done and what remains for investigation. and this is most important, for it is undoubtedly the case that many ervations of interest and value are made every year without being pu shed, chiefly, perhaps, because those who make them are unaware tha hey have not previously been given to the world. The amount of literature examined in the preparation of this work was very great, and the care necessary to avoid errors and omissions proportionate. The table on page 7 shows that some part of the earlier stages of 1069 butterflies and moths have been described, but many of these descriptions are very incomplete, and we can thus see how much still remains to be done in working out these life histories. Of course in a work of this kind, where the field was so large, it was inevitable that some mistakes and omissions should occur, but it is most creditable to Mr. Edwards that they should be so few and so unimportant. It was unfortunate that the printing had to be done during the absence of Mr. Edwards in Australia, as otherwise most of the typographical errors would unquestionably have been detected and corrected. It is, however, a mistake to refer to author's separates, instead of to the work in which the description originally appeared, as for example in regard to the larva of *Chionobas Macounii*—the reference given is "J. Fletcher, a trip to Nepigon, p. 12," whereas it ought to be, "J. Fletcher, Rep. Ent. Soc, Ont., 1888, p. 85." It is greatly to be hoped that Mr. Edwards will be able to fulfil his promise to issue yearly supplements, in order that the work may be kept up to date and its usefulness be thus maintained. The price of this work was fifty cents, but the first edition has already been exhausted. It is greatly to be hoped that a new edition will soon be issued, as no working lepidopterist can get on without it. H. H. LYMAN.

Mailed March 3rd.

The Canadian Entomologist.

VOL XXIII. LONDON, APRIL, 1891. No. 4.

MEETINGS OF THE MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Jan. 13, 1891.—The 159th meeting of the Branch was held at 74 McTavish street, Mr. H. H. Lyman, President, in the chair. Mr. J. F. Hausen read a "Description of a New Species of the Coleopterous Genus *Pterostichus*," which he has named *Pterostichus conspicuipes*, on account of its bright yellow legs. The type was taken at Lachine. Mr. Hausen also read a note "On the Occurrence of *Gracilia minuta*, Fab., at Montreal."

Feb. 10, 1891.—The 160th meeting of the Branch was held at 74 McTavish street, Mr. H. H. Lyman, President, in the chair. There was a good attendance of members, and Mr. James Fletcher, Dominion Entomologist and Vice-President of the parent society, was also present.

Mr. Lyman read "A Preliminary Paper on the Genus *Chionobas*," in which the different species and reputed species inhabiting this continent and the north of Europe were compared, and attention drawn to the wide difference of opinion among entomologists as to the distinctness of the various forms. The paper was illustrated by a large number of specimens from the collections of Messrs. Lyman, Fletcher and Winn, the following forms being represented:—*Gigas*, *Californica*, *Nevadensis ?*, *Macounii*, *Chryxus*, *Aello*, *Varuna*, *Uhleri*, *Tarpeia*, *Bore vera*, *Taygete*, *Jutta*, *Oeno*, *Semidea*, *Brucei*, *Crambis*, *Subhyalina ?*, from Hudson's Straits; *Semidea var.?*, from Colorado; and *Semidea var.?*, from Laggan.

A discussion followed, after which Mr. Caulfield read a paper entitled "Notes on the Gryllidæ—Field Crickets," illustrated by specimens. Mr. Hausen read a "Preliminary Notice of Three New Species of *Pterostichus* —Systematic Notes." The species are to be called *Pulvinatus*, *Stenopus* and *Strictus*. The types were taken in the vicinity of Montreal. This paper is to be published in the Canadian Record of Science, with a plate and synoptic table of species. After spending some time examining some

specimens of very interesting species of Lepidoptera, exhibited by Messrs. Fletcher and Lyman, the meeting adjourned.

March 11, 1891.—The 161st meeting of the Branch was held at 74 McTavish St., Mr. H. H. Lyman, President, in the chair. There was a fair attendance of members, and the Rev. T. W. Fyles, of South Quebec, was also present. Mr. Winn read an interesting paper entitled "Notes on Some Methods of Col giving his experience in this connection and in the bree Mr. Lyman read a "Report on a Collection of Lepidoptera u rth of Lake Huron," made by Dr. Robert Bell, F. R. S. C., Assis t ector of the Geological Survey. The collection contained fifty-four , and the report will be published in the Annual Report of the ogical Survey. Mr. Hausen exhibited the proofs of his forthc te in the Canadian Record of Science, and a number of intere cimens were exhibited by the members.

A. F. WINN, Secretary.

TEN NEW SPECIES OF ORTHOPTERA FROM NEBRASKA—NOTES ON HABITS, WING VARIATION, ETC.

BY LAWRENCE BRUNER, LINCOLN, NEBRASKA.

(Continued from page 59.)

Orchelimum gracile, n sp.—A slenderer and somewhat smaller insect than either *O. vulgare* or *O. concinnum*, from both of which it differs in the form of its pronotum and of the ovipositor. The tubercle of the vertex is short, broad, and has the apex rounded. The tegmina and wings are of moderate length, very delicate in texture, and in the male furnished with an inconspicuous musical apparatus very similar in proportions to that of *agile* and *longipennis*. Legs slender, the posterior femora not quite reaching the tips of the closed tegmina. Terminal segment of the male abdomen quite broad; the anal cerci stout and acuminate, with the internal tooth minute; subgenital plate broad and long, reaching beyond the tips of the cerci. The ovipositor unusually long, broad, nearly straight and fine pointed.

In colour it is pale transparent-green with a broad reddish-brown band upon the head and pronotum, continuous from the tip of the vertex to the posterior transverse indentation of the pronotum, somewhat paler in the middle; upon the latter, rather broadly bordered by yellowish-white throughout. Face and mouth parts together with the genital arma-

ture of the male ochreous; ovipositor light reddish-brown. Tarsi and sometimes also the tibiæ a trifle infuscated.

Length of body, ♂, 16 mm., ♀, 17.5 mm.; of antennæ, ♂ and ♀, about 50 mm.; of pronotum, ♂, 3.8 mm., ♀, 4 mm.; of tegmina, ♂, 19 mm., ♀, 20 mm.; of hind femora, ♂, 14 mm., ♀, 15 mm.; of ovipositor, 11-12 mm.

This particular species is quite common in the vicinity of West Point, Nebraska, about the margins of ponds and along the edges of streams where it frequents rank growing grasses and sedges. I have also taken it several times at the electric lights in the city of Lincoln, while it was observed to be very common in the sand hill region of Wheeler, Garfield and Holt counties. It has never been found by me outside of the State, nor has it been sent to me from beyond our boundary.

Its song is very low and more rapid than that of *O. glaberrimum* and *O. vulgare.*

The uncommonly long ovipositor of this insect would indicate a slight variation from the normal egg-laying habits of the other members of the genus; but just what this variation is has not been ascertained.

Orchelimum gladiator, n sp.—This second species of meadow grasshopper of the genus *Orchelimum* which is now characterized, appears to be quite distinct from all other described North American forms. Its chief distinguishing character is its very broad, nearly straight ovipositor of more than the ordinary length. In its general structure it resembles the more robust species like *O. glaberrimum* and *O. concinnum.* It differs from these, however, in having shorter legs and antennæ. The posterior femora are rather slender; the cone of the vertex is short and obtuse, with the extreme tip shallowly sulcate; the eyes are rather large but not prominent, the hind wings are little if any longer than the tegmina, which do not quite reach the tip of the ovipositor.

Colour, pale transparent grass-green throughout, save the usual markings upon the occiput and disk of the pronotum which are dark brown, on the latter composed of two well defined narrow, slightly diverging lines. The dorsal portion is also tinged with brown. Antennæ rufous; feet and extreme tip of the ovipositor tinged with rufous.

Length of body, ♀, 18 mm.; of antennæ, 35 mm.; of pronotum, 4.75 mm.; of tegmina and wings, 19 mm.; of posterior femora, 15.5 mm.; of ovipositor, 10 mm.; greatest width of ovipositor, 1.82 mm.

Described from two female specimens taken upon the flowers of one

of the golden rods *(Solidago rigida)* at West Point, Nebraska, during the latter part of the month of September, 1886. Male not known to me.

The species is evidently quite local in its distribution; and perhaps also quite rare. A better knowledge of the habits of our North American Orthoptera may also aid in finding them.

There is a single female specimen of a closely allied, though distinct species, in my collection, in the District of Columbia. This latter form is also un can be known temporarily as *Orchelimum minor*, from its rat size and short wings. It is slenderer and in every way smaller than *O. gladiator*. In colour it is rather less green than usual, and has the brown markings very decided. Its ovipositor which resembles that of *gla iator* is also brown instead of green.

I have still other undescribed *Orchelimums* in my cabinet, but must postpone their description for a future paper. If others who have specimens of these insects in their collections which do not appear to have been described, and they do not care to work them over themselves, it would be deemed a favour if they were sent to the writer, who would then endeavour to prepare a paper on the two genera which would include all of the known as well as any new forms that might still remain undescribed.

In addition to several described species of *Conocephalus*, we have here in Nebraska a heavier bodied and shorter winged form than the *C. ensiger* Harris, which appears to be new.

Conocephalus nebrascensis, n sp.—Most closely related to *C. ensiger*. Cone of the vertex entirely black beneath; ovipositor long and lance-like.

Cone of the vertex rather slender, its sides parallel from a little in advance of the eyes to its middle, from which point it tapers to the rounded apex; the basal tooth quite prominent. Eyes large and prominent, usually dark coloured. Pronotum large and broad, the shoulders well defined, the posterior extremity broadly rounded, the deflected lobes or "side laps" spreading below; the entire surface rather shallowly punctate, glabrous. Tegmina coriaceous, with large coarse tympanum in the male—very similar to that of *C. crepitans* and *C. robustus* Scudd. Posterior femora moderately slender, short, and with both the inner and outer lower carinæ provided with spines. Anal cerci stout, with strong internal hooks; sub-genital plate quite large and broad; the projecting "digits" widely separated and small. Ovipositor long and slender,

lanceolate, a little curved upwards and extending about one-fourth of an inch beyond the closed tegmina.

General colour bright grass-green, with yellowish lines along the lateral carinæ of the pronotum. Posterior tibiæ together with all the feet more or less infuscated. Antennæ testaceous or rufous.

Length of body, ♂, 28 mm., ♀, 32 mm.; of cone, ♂ and ♀, 3.5 mm.; of pronotum, ♂ and ♀, 8 mm.; of tegmina, ♂, 36 mm., ♀ 40 mm.; of hind femora, ♂, 20 mm., ♀, 23 mm.; of ovipositor, 30 mm.

Habitat.—Found throughout the eastern part of the State, where it occurs most frequently in the natural groves growing along our principal streams. I have also seen specimens of it that were taken in Iowa and Illinois, and have specimens from both of these last named States in my collection.

Amblycorypha Scudderæ, n sp.—Very similar to, but smaller than the *A. oblongifolia*.

Pale to dark green. Disk of the pronotum flat, gradually expanding posteriorly; the lateral angles or shoulders quite sharp; the lateral lobes with their posterior lower edge broadly rounded. Tegmina quite heavy and opaque, rather rough and of a dull green colour—especially so in the female specimens; the costal area full and evenly rounded. Posterior femora moderately stout, slightly surpassing (♀) or not quite reaching (♂) the tips of the tegmina, their inner margin furnished with 7 or 8 short spines. "Shrilling" field of the tegmina large and flat, as in *oblongifolia*, a little broader than the posterior extremity of the pronotum. Ovipositor evenly curved, the apical third strongly toothed.

Length of body, ♂, 22 mm., ♀, 22 mm.; of pronotum, ♂, 6 mm., ♀, 6.65 mm.; of tegmina, ♂, 33 mm., ♀, 32 mm.; width of tegmina, ♂, 10 mm., ♀, 10.5 mm.; length of hind femora, ♂, 28 mm., ♀, 29 mm.; of ovipositor, 11 mm.

One of our commonest katydids throughout the eastern or wooded portion of Nebraska. It is especially numerous among the groves of oaks and other hard wood trees.

Like *oblongifolia*, this katydid produces the peculiar chick-chick noise which is so characteristic a sound in our groves at night during the months of August and September. *Scudderæ* is to be distinguished from that species by its smaller size, the more evenly rounded or arcuate edges of the tegmina, the comparatively shorter hind legs, and the more strongly serrated point of the female ovipositor.

SOME INDIANA ACRIDIDÆ.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

But little attention has heretofore been given to the *Acrididæ* inhabiting Indiana by the working scientists of the State. No record of any published paper relating to them can be found, and it is believed, we suppose, that because Indiana lies [illegible] where Dr. Cyrus H. Thomas did much of his work, th[illegible] of the species of the family found in this State are in[illegible]wo lists of the Orthoptera of Illinois prepared by him.

That such belief is an erron[illegible]s one[illegible] shown by the fact, that in the single county of Vigo, which lies adjac[illegible] to the eastern border of Illinois, and midway between the north and sou[illegible] boundaries of this State, seven species have been taken by the writer which are not given in either of Thomas's lists, three of which have not heretofore been recorded nearer Indiana than New England, or the Gulf States, and the remaining four no nearer than Kansas.

Believing that a list of those taken in the county would prove of value as a basis for a more complete list of those inhabiting the State, the one below has been prepared. The nomenclature is that agreed upon by the most prominent authorities of the present time, and is for the most part derived from the works of Scudder and Saussure. In order that it may not confuse beginners who may use the list for reference, I give the synonymy of the descriptions of the different species as gathered from the literature to which I have had access. Brief notes relating to the comparative abundance, places of resort, and variations where noted, of each species are also given.

My especial thanks are due to Prof. Lawrence Bruner, of Lincoln, Nebraska, and to Mr. S. H. Scudder, of Cambridge, Massachusetts, for the verification of doubtful species and for information regarding the heretofore known range of the rarer ones.

The following works have been consulted in the study of the species listed, and to them reference is made in the synonymy given :—

Harris, Dr. T. W.—Treatise on Some Insects Injurious to Vegetation. 3rd edition. 1862.

Riley, Packard and Thomas.—Reports of the U. S. Entomological Commission, 1877, 1878, 1883.

Riley, C. V.—Report of U. S. Entomologist in U. S. Agricultural Report for 1883.

Saussure, Henri D.—Prodromus Œdipodiorum Insectorum, etc. Geneva, 1884.

Scudder, S. H.—"Catalogue of the Orthoptera of N. A.," 1867. Proceedings of the Boston Society of Nat. History, XVII., XIX. and XX., 1875, 1877, 1879.

Thomas, Cyrus H.—"Insects Injurious to Vegetation in Illinois," in the Transactions of the Illinois State Agricultural Society, V., 1865; "Synopsis of the Acrididæ of N. A.," 1873; "List of the Orthoptera of Illinois," in Bulletin I. of the Illinois Museum of Natural History, 1876; "The Acrididæ of Illinois," in the Ninth Report of the State Entomologist of Illinois, 1880.

ACRIDIDÆ.

ACRIDINÆ.

TRUXALINI.

1. TRUXALIS BREVICORNIS, Linn.

Pyrgomorpha brevicornis, Thos., Syn. Acrid, N. A., 1873, 67.
Truxalis brevicornis, Id., Ninth Rep. St. Ent. Ill., 1880, 97.
Opsomala punctipennis, Id., Trans. Ill. St. Agl. Soc., V., 1865, 447.
Pyrgomorpha punctipennis, Id., Syn. Acrid. N. A., 1873, 68.

About a dozen specimens of this rare species were taken from tall coarse grass, near the border of a pond, on Oct. 11, 1890. Its range is southern, and Vigo county is, as far as known, the most northern point at which it has been collected. The female varies in colour from a bright pea green to a uniform rusty brown. The males, which are much smaller, have the back green and the rest of the body brown.

2. CHRYSOCHRAON VIRIDIS, Scudd. Short-winged Green Grasshopper.

Chrysochraon viridis, Thos., Syn. Acrid. N. A., 1873, 76.
Chloealtis viridis, Id, Ninth Rep. St. Ent. Ill., 1880, 99.
Opsomala brevipennis, Id., Trans. Ill. Agl. Soc., V., 1865, 451.

This species is quite frequent in the coarse grass which grows in open wet places, and is also at times to be found along the borders of woods. It is coloured much like the preceding, and the variations are the same.

3. CHRYSOCHRAON CONSPERSA, Harris. The Sprinkled Grasshopper.

Locusta conspersa, Harris, Ins. Inj., 1862, 184.
Chrysochraon conspersum, Thos., Syn. Acrid. N. A., 1873, 76.
Chloealtis conspersa, Id., Ninth Rep. St. Ent. Ill., 1880, 99.
Locusta abortiva, Harris, Ins. Inj., 1862, 184.

Rare. A single pair in copulation were taken Oct. 11, 1890, and two or three others two weeks later, one of which, a female, had the elytra extending slightly beyond the tip of the abdomen.

4. SYRBULA ADMIRABILIS, Uhler. The Handsome Grasshopper.
Stenobothrus admirabilis, Thos., Syn. Acrid. N. A., 1873, 84.
Syrbula admirabilis, Id., Ninth Rep. St. Ent., Ill., 1880, 100.

The females of this [illegible] not uncommon in upland meadows, and along fence r[illegible]es are, however, seldom seen, probably on account of their smaller size and duller colour.

5. CHLOEÄLTIS CURTIPENNIS, Harris. The Short-winged Brown Grasshopper.
Locusta (Chloeältis) curtipennis, Harris, Ins. Inj., 1862, 184, pl. III., fig. 1.
Stenobothrus curtipennis, Thos., Syn. Acrid. N. A., 1873, 91.
Id., Ninth Rep. St. Ent., Ill., 1880, 104.

Scarce. It frequents meadows and damp, swampy places which are covered with a rich growth of grass.

OEDIPODINI.

6. CHORTOPHAGA VIRIDIFASCIATA, De Geer. The Green-striped Grasshopper.
Locusta viridifasciata, Harris, Ins. Inj., 1862, 182, pl. III., fig. 2.
Thos., Trans. Ill. St. Agl Soc., V., 1865, 451.
Tragocephala viridifasciata, Id., Syn. Acrid. N. A., 1873, 103.
Id., Ninth Rep. St. Ent., Ill., 1880, 105, figs. 13, 17.
Scudder, Proceed. Bost. Soc. Nat. Hist., XVII., 1875, 481.

The full-grown individuals of this species are more common in May and June than those of any other grasshopper, as its larvæ hibernate, whereas most other species pass the winter in the egg state. It frequents dry, open woods and roadsides, where the half-grown young can be seen jumping vigorously about on any warm sunny day in winter.

6 (a). CHORTOPHAGA VIRIDIFASCIATA INFUSCATA, Harris. The Dusky Grasshopper.
Locusta infuscata, Harris, Ins. Inj., 1862, 181.

Tragocephala infuscata, Thos., Syn. Acrid. N. A., 1873, 102.
Tragocephala viridifasciata infuscata, Id., Ninth Rep. St. Ent., Ill., 1880, 106.
Scudd., Proceed. Bost. Soc. Nat. Hist., XVII, 1875, 481.

This dark variety of the green-striped grasshopper is quite frequent in April and May, but rare after June 1, when *viridifasciata* seems to take its place. It is probably a mere seasonal form of that species.

7. ENCOPTOLOPHUS SORDIDUS, Burm. The Clouded Grasshopper.
Œdipoda sordida, Thos., Syn. Acrid. N. A., 1873, 116.
Tragocephala sordida, Id., Ninth Rep. St. Ent., Ill., 1880, 107.
Encoptolophus sordidus, Scudd., Proceed. Bost. Soc. Nat. Hist., XVII., 1875, 479.
Locusta nebulosa, Harris, Ins. Inj., 1862, 181.

Rather common in upland meadows and pastures as late as Nov. 22, but is never found about wet places. The males, although small in size, stridulate just as they arise from the ground with a loud crackling noise similar to that made by burning stubble. It flies but a short distance before alighting.

8. ARPHIA SULPHUREUS, Fab. The Yellow-winged Grasshopper.
Locusta sulphurea, Harris, Ins. Inj., 1862, 177, pl. I., fig. 6.
Tomonotus sulphureus, Thomas, Syn. Acrid., N. A., 1873, 105.
Id., Ninth Rep. St. Ent., Ill., 1880, 107.

Although very common in some parts of Indiana, this is a scarce grasshopper in Vigo Co., where the next species seems to take its place. It frequents dry open woods and roadsides.

9. ARPHIA XANTHOPTERA, Burm.
Tomonotus xanthopterus, Thos., Syn. Acrid., 1873, 105.
Tomonotus sulphureus xanthopterus, Id., Ninth Rep. St. Ent. Ill., 1880, 108.

A common species in dry, sandy fields, prairies and borders of meadows. When flushed it flies for a long distance in a zigzag way, the male making a loud rattling noise with every onward motion. Dr. Thomas in his later writings classed *xanthoptera* as a variety of *sulphureus*, but I have carefully compared a large number of specimens of each, and can find no intermediate forms.

9 (a). ARPHIA XANTHOPTERA CARINATA, Scudd.

Tomonotus carinatus, Thos., Syn. Acrid., N. A., 1873, 106.

Tomonotus sulphureus carinatus, Id., Ninth Rep. St. Ent. Ill., 1880, 108.

Six or eight specimens of a grasshopper, which, from the descriptions cited above, I take to be the one described by Scudder as *Œdipoda carinata*, were taken. It as says, very closely allied to *xanthoptera*, but is always our approaching a black; the inner wings are deep reddi he median carina of the pronotum higher than in that species. More er, the stridulation of the male is different, as it can be heard for rods a ay, the loud chr-r-r-r-r being sounded just as it leaves the ground, and not while on the wing, as is that of *xanthoptera*. These differences, how ver, are so minor that I follow Thomas in placing it as a variety of that species.

10. SPHARAGEMON BALTEATUM, Scudd.

Spharagemon balteatum, Scudder, Proceed. Bost Soc. Nat. Hist., XVII., 1875, 469.

. A rare species found in dry, open, upland woods. Four specimens were taken Oct. 12, two in copulation. It is not included in either of Dr. Thomas's Illinois lists, and although it ranges from Maine to Texas, has not before been recorded closer than New Jersey on the east and Kansas on the west.

11. DISSOSTEIRA CAROLINA, Linn. The Black-winged Grasshopper.

Locusta carolina, Harris, Ins. Inj., 1862, 176, pl. III., fig. 3.

Œaipoda carolina, Thomas, Syn. Acrid. N. A., 1873, 117.

Id., Ninth Rep. St. Ent., Ill., 1880, 111.

This common species is readily known by its broad, black, yellow-bordered hind wings, and by its habit of flying rather than hopping when disturbed; many persons taking it for a butterfly when it is on the wing. It is more often found along roadsides and railways than in meadows and pastures.

12. HIPPISCUS RUGOSUS, Scudd. The Clumsy Grasshopper.

Œdipoda rugosa, Thos., Syn. Acrid. N. A., 1873, 132.

Hippiscus, corallipes rugosa, Id., Ninth Rep. St. Ent., Ill., 1880, 115.

This large, thick-bodied species is rather common in autumn, its favorite resorts being timothy stubble or open, upland pastures. When

disturbed it flies but a short distance, and without noise, except the flutter of its wings. When on the ground it is very clumsy, on account of its large size, and is easily caught with the hands.

12 (a). HIPPISCUS RUGOSUS PARADOXA, Thos.

Œdipoda paradoxa, Thos., Syn. Acrid. N. A., 1873, 132.

Four very large specimens, having the base of wings a bright coral red instead of yellow, were taken. The dark spots on the elytra also varied slightly from those of the typical *rugosus*, but other than this I could detect no differences, and I hence refer them to the above-named variety.

13. HIPPISCUS PHŒNICOPTERA, German. The Coral Winged Grasshopper.

Œdipoda phœnicoptera, Thos., Syn. Acrid. N. A., 1873, 135.

Hippiscus phœnicopterus, Id., Ninth Rep. St. Ent., Ill., 1880, 117, figs. 14, 18.

Locusta corallina, Harris, Ins. Inj., 1862, 176.

An uncommon species, frequenting open woods and meadows from May to September, but rarely found in late autumn. It resembles *H. rugosus* in form and size, but is more active and stridulates much louder than that species. The larvæ evidently hibernate as the imagoes are found so early in the season.

ACRIDINI.

14. SCHISTOCERCA AMERICANA, Drury. The American Grasshopper.

Acridum americanum, Thos., Trans. Ill. St. Agl. Soc., V., 1865, 448.
Id., Syn. Acrid. N. A., 1873, 172.
Id., Ninth Rep. St. Ent., Ill., 1880, 129, fig. 10.

This large and handsome grasshopper was quite common, even as late as Nov. 22, along fence-rows, borders of thickets and in low, open oak woods, but was seldom seen in open meadows or pastures. More often than any other species it is found on fences, and when flushed it rises quickly and with a whirring noise, made by its wings in flight. It moves rapidly a long distance, and very frequently alights in a bush or low tree instead of on the ground.

15. ACRIDIUM ALUTACEUM, Harris. The Leather-colored Grasshopper.

Acridium alutaceum, Harris, Ins. Inj., 1862, 173.
Thos., Syn. Acrid. N. A., 1873, 171.

A rare species, having been noted on but one occasion, along the sandy embankment of a railway, when, perhaps, a dozen specimens were taken on Oct. 11. The males were very brightly coloured, having evidently just moulted for the last time. Like the preceding species, it flies more often than it hops, moving with the same rapid flight, but not so far as *S. Americana.*

A single specimen of th[illegible]ten in Monroe Co., Ind., in 1886, and at the time was [illegible] *marginatum*, Uhler, with the description of which, as given by [illegible] it closely agrees. It is not recorded from Illinois, nor from an[illegible] nearer than Kansas, as far as I can ascertain.

16. PEZOTETTIX ROTUNDIPENNIS, Scudd. The Round-winged Grasshopper.

Pezotettix rotundipennis, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX., 1877, 86.

This species was named for me by Dr. Scudder, as I did not have the description cited above at the time it was taken. It has been known heretofore only from Florida. In Vigo County it is rather scarce, and frequents the borders of blue grass pastures and roadsides. The female appears much more common than the males, only two or three of the latter having been seen. It has been taken as late as Nov. 22, when two females were found on the lower plank of a fence enjoying the sunshine. A single pair were noted in copulation Oct. 11, 1890.

17. PEZOTETTIX SCUDDERI, Uhler. Scudder's Grasshopper.

Pezotettix scudderi, Thos., Syn. Acrid. N. A., 1873, 152.
Id., Ninth Rep. St. Ent., Ill., 1880, 121.

In October and November this species is very common in open woods and pastures, especially near the borders of them, where upon the lower part of the fences it delights to collect during the short autumn afternoons.

18. PEZOTETTIX VIRIDIPES (?) Walsh, Mss.

A single specimen taken from the roadside on Oct. 11, 1890, was referred to Dr. Scudder for identification. He returned it with the above name marked doubtfully, stating that it "differed from the typical specimen in the nearly complete obliteration of the median carina of the prozona." I have seen no description of it.

19 PEZOTETTIX GRACILIS, Bruner.

Pezotettix minutipennis, Thos., Bull. Ill. Mus. Nat. Hist., I., 1876, 66.
Id., Ninth Rep. St. Ent. Ill., 1880, 119.
Pezotettix manca (?) (Smith), Thos., Syn. Acrid. N. A., 1873, 149.

This species was identified as *P. minutipennis*, Thos., and sent to Mr. Bruner for verification. He referred it to *P. gracilis*, Bruner, of which I have no description, but Scudder. Proceed. Bost. Soc. Nat. Hist., XX., 1879, 77, says that *minutipennis* is a synonym of *gracilis*. It differs but slightly from the description of *P. manca*, Smith, as given by Thomas in his Synopsis, and in my opinion the latter is also a synonym.

About a dozen specimens were taken from low open woods. The sexes were found paired Oct. 11 and Nov. 1.

20. PEZOTETTIX VIOLA, Thos.

Pezotettix viola, Thos., Bull. Ill. Mus. Nat. Hist., I., 1876, 68.
Id., Ninth Rep. St. Ent. Ill., 1880, 120.
Caloptenus nigrescens, Scudd., Proceed. Bost. Soc Nat. Hist, XIX., 1877, 27.

Among some grasshoppers sent to Mr. Bruner were two which I had identified as *P. viola*, Thos. He returned their name as *P. occidentalis*, Bruner. Specimens were afterwards sent to Mr. Scudder, who referred them to *P. nigrescens*, Scudd., and wrote that he had *P. occidentalis*, and that it was certainly distinct from *P. nigrescens*, but that he had never yet determined *P. viola*. At the same time he forwarded his description of *P. nigrescens*, cited above, which after careful comparison I believe to be synonymous with *P. viola*, the latter having the precedence. Having never seen a description of *P. occidentalis* I cannot say as to whether *P. viola* is a synonym of it or not.

The species is not a common one, only a half a dozen specimens having been taken. It is found in company with *P. scudderi* in open woods. *P. viola*, according to Thomas, occurs in central and southern Ill. *P. nigrescens* was described from Georgia.

21. MELANOPLUS MINOR, Scudd.

Caloptenus minor, Scudd., Proceed. Bost. Soc. Nat. Hist., XVII., 1875, 478.

This is a Western species not having been taken before east of Central Illinois. But two specimens were taken. They were found in company with the next species along the borders of a woodland pasture on October 11.

(To be continued.)

PREPARATORY STAGES OF DATANA PERSPICUA, G. & R., AND CERURA BOREALIS, BOISD.

BY HARRISON G. DYAR, NEW YORK.

DATANA PERSPICUA.—*Egg:* In general shape subpyriform; flattened at base and top, depressed centrally at vertex, the usual black spot small and indistinct, situated [illegible] punctiform depression; the whole surface punctured. [illegible] lid-like top of a somewhat brighter white. Width .9 [illegible] mm. The egg is of the type of *D. major*, but resembles the [illegible] *sinistra* in coloration by possessing a discolorous lid-like to[illegible] part of the shell eaten by the young larva in hatching. [illegible] s of varying numbers on the under side of the leaves of the [illegible]

First stage: When first [illegible] ead is black, .5 mm. wide; the body yellowish with a reddis[illegible] subdorsal line, not reaching the extremities; cervical shield, [illegible] al plate black. As the stage advances the body becomes [illegible] four lateral yellow stripes on each side and three ventral, as in allies, which remain throughout the larval stages. They are nearly as wide as the intervening lateral spaces, a little confluent posteriorly and are coloured yellow. Black hairs arise from small black tubercles and from the elevated anal feet. Length near completion of this stage about 5 mm.

Second stage: Head higher than wide, slightly punctured, black; width 1.1 mm. Body parts coloured as before. The hair is short, blackish and arises from minute tubercles that are much smaller than in the previous stage.

Third stage: Head shiny black, punctured, the clypeus smooth; width 1.6-1.8 mm. Cervical shield, anal plate and thoracic feet black. Body dark red, the stripes broader than the intervening spaces, bright yellow; abdominal feet red, the anal pair black. A few short hairs; spiracles small, black.

Fourth stage: Head as before, or in other examples, bright wine-red, the lower part of the clypeus, eyes and mouth parts, black; width 2.7 mm. Body as before, the stripes partly confluent posteriorly, hardly so anteriorly; spiracles black, larger than before. Or the cervical shield and anal plate may be wine red, the stripes broad, lemon yellow, moderately confluent at both ends; thoracic and anal feet and the abdominal feet outwardly very slightly black. Hair 5 mm. long, whitish, besides other more abundant fine short hair.

Fifth stage: Head rounded, depressed at the sutures of the clypeus, punctured, shining, usually black; width 4.1 mm.; cervical shield, anal plate and legs black, except occasionally the shield, plate and nearly all of the head is wine-red, or rather blood-red. All kinds of intergrading examples occur. The body is usually black, rarely red, the stripes broad, bright lemon-yellow, somewhat confluent posteriorly. Hair whitish, rather abundant but not long, with other more numerous short, brownish hairs. Bases of abdominal feet a little reddish. In two examples the stripes were much narrower than usual, especially posteriorly, and were much broken, the upper ones consisting of series of little yellow dots. Both had black heads, and they were not alike, as one was much nearer the normal form than the other.

Pupa: Formed in a subterraneous cell, cylindrical; the abdominal segments gently rounded; sutures deep, capable of motion; cases moderately prominent, especially those covering the palpi; two cremasters, very short, each bearing two spines, the outer the shorter, all in a transverse line; cases finely creased; body densely punctured; colour mahogany-red; cremasters blackish. Length 24 mm; width 7 mm. The species is single brooded, though occasionally a few individuals may emerge the same year in confinement, possibly indicating two broods in the southern part of its habitat.

Food plants: Sumach (*Rhus glabra* and *R. typhina*).

Larvæ from Duchess and Ulster counties, N. Y. Abundant; the commonest species of *Datana* in the electric lamps at Poughkeepsie. This larva is well protected by its coloration, which resembles the usual colours (bright red and yellow) of dying Sumach leaves, and it is usually on the lower parts of the bush where such coloured leaves occur that the larvæ amass themselves, especially when young.

CERURA BOREALIS, Boisd.—*Egg:* Less than hemispherical—obtusely conoidal, the base flat; minutely shagreened; colour black; a little lustrous, but not shiny. Laid singly on either surface of the leaf.

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Second stage: Head red-brown, not shiny, the upper half darker; mouth parts blackish; width 1.1 mm. A pair of subdorsal horns on the prothoracic segment, short and spinose; stemapods 5 mm. long, only slightly spined; a transverse row of minute spines on each segment. Body purplish brown over the dorsum nearly to the spiracles, this colour cov-

ering the thoracic segments entirely and ventrally on the seventh to the tenth abdominal segments. The rest of the body is green. The back centrally is a little paler than elsewhere, especially on the metathoracic and first abdominal segments, except in a dorsal line. Spiracles minute, black ringed. Stemapods dark red-brown, twice annulated with whitish and tipped with the same colour. Thoracic feet black; abdominal feet green.

Third stage: Hea[d] wine-red, paler on the lower part, minutely but thickly [s]le paler spots; ocelli black; antennæ pale; width 1.6 m[m] s tuberculated, each with a hair; tails spinose. Thoracic seg[ments] alf of body nearly to spiracles and the last three abdomi[nal] joints 12 and 13) ventrally, brownish vinous, as are also [the] it for the two broad whitish annulations. The rest of the [body] ; the thoracic feet pale testaceous. Piliferous tubercles as b[efore] the stage advances the brown colour on the dorsum fades [to] posterior thoracic and first abdominal segments (joints 3- [4]) a triangular patch on the two anterior thoracic segments (joints 2 and 3), which is narrowly connected with the rest of the dorsal colour by a line on the metathoracic segment (joint 4), that rapidly widens on the first abdominal segment (joint 5).

Fourth stage: Head brownish wine-red, the upper two-thirds thickly covered with little round reddish dots, but leaving a narrow line of the ground colour on each side of, and parallel to, the central suture; paler or yellowish at the sides posteriorly; ocelli blackish; antennæ white, brownish toward the tips; width 2.5 mm. Cervical shield red-brown, speckled like the head with little dots but less thickly; the horns on either side of it thick, round, tuberculated; stemapods 9 mm. long, curled up a little at the ends, spinose and coloured red-brown, twice annulated with sordid white. The extensile threads are pinkish at base with a white ring, the terminal part black. Body a little elevated dorsally on the posterior part of the mesothoracic segment (joint 3) but without any process on the metathoracic segment. It is pale green with a broad ferruginous-brown dorsal band which is triangular on the first two thoracic segments, covering the horns, narrows to a line on the metathoracic segment and widening continuously again just reaches the spiracle on the fourth abdominal segment (joint 8), after which it narrows, reaching a minimum in the suture between the seventh and eighth abdominal segments (though still quite wide), widens a little and slightly contracts to cover the anal plate. The band contains some minute

piliferous tubercles and is faintly bordered with yellow. Spiracles pale ochre; venter paler, whitish, with a purple medio-ventral line on the eighth to the tenth abdominal segments. Feet concolorous with the body. As the stage advances some small brown spots appear on the sides.

Fifth stage: Head rounded, flat in front, the clypeus a little depressed, with two vertical ridges below; colour purplish brown, the little yellowish spots arranged as before; clypeus and mouth reddish, jaws black outwardly; antennæ reddish, their bases yellow; ocelli black; the lateral posterior part of the head pale yellow; width 3.6 mm. A few hairs. Body shaped as in the previous stage, the cervical horns present but small, smooth, punctured at the ends, projecting laterally in line with the cervical shield. Tails tuberculated, each tubercle with a fine spine; 11 mm. long; extensile threads black with a white ring, yellowish at base. Body pale whitish-yellow, becoming pale lemon-yellow, the dorsal band ferruginous-brown, shaped as before. On the cervical shield it is marked like the head and bisected by a narrow pale dorsal line; it covers the upper part of the cervical horns, passes below the spiracle on the fourth abdominal segment, narrows to a minimum on the eighth abdominal segment (where it is thrice as wide as on the metathoracic segment) and ends elliptically, covering the anal plate. It is edged with blackish brown and contains a diffuse dorsal and three oblique lateral bands of the same colour, posterior to the latter of which are faint yellowish mottlings. In the lateral angle of the band is also a blackish-brown shade. Tails concolorous, twice annulated with pale yellow. On the lateral region are a few minute hairs and some faint brown spots. Spiracles ochre in a very narrow brown border, and obscurely surrounded by brown clouds. A series of subventral blackish-brown spots and a medio-ventral line posteriorly. Thoracic feet brownish testaceous; abdominal feet pale yellow. The erect spines at the anus are black. Length of larva, exclusive of the stemapods, 22 mm. As the stage advances the dorsal band becomes paler, the cervical shield pinkish, and the markings are more distinct.

Cocoon: Like those of the other species of *Cerura*, but rather flatter for its size. Length 38 mm.; width 11 mm.; height above the surface of the wood 6 mm.

Pupa: Cylindrical, flattened a little on the ventral side, the ends rounded, not tapering; cases prominent, those covering the antennæ

large; a slight depression behind thorax dorsally; no cremaster; colour red-brown; cases finely wrinkled; dull; body smooth, slightly shiny. Length 17 mm.; width 5 mm. Duration of this stage, through the winter.

Food plant: Wild Cherry *(Prunus serotina).*

Larvæ from Dutchess Co., N. Y.

Widths of head for th[illegible]alculated from the width at the last stage, ratio .68, are:— [illegible]nm., 1.66 mm., 2.45 mm., 3.6 mm. Observed:—1.1 mn. [illegible] mm., 3.6 mm.

The species of *Cerura* n[illegible]d as follows:—

Primaries crossed at basal tr[illegible] by a dark gray band.

Primaries white.

Six black spots in an ellipse on disk. ..... *borealis*, Bd.

Indistinct dental lines on disk.

Transverse band broad ..... *aquilonaris*, Lintn.

Transverse band narrow, sometimes broken .. *albicoma*, Strk.

Primaries pale cinereous.

Three dentate lines on disk ..... *occidentalis*, Lintn.

A row of dots on disk ..... var. *cinereoides*, Dyar.

Primaries dark cinereous ..... *cinerea*, Walk.

Primaries crossed by many dentate black lines.

Secondaries white.

Lines continuous ..... *scitiscripta*, Walk.

Lines interrupted ..... var. *candida*, Lintn.

Secondaries black ..... *multiscripta*, Riley.

Of these the larvæ of four are known and can be separated by the following table:—

No dorsal process on metathoracic segment.

Edges of dorsal band even.

Dorsal elevation on mesothoracic segment simple .... *borealis*, Bd.

Dorsal elevation double ..... *occidentalis*, Lintn

Edges of dorsal band irregular.

Band spotted with yellow ..... *cinerea*, Walk

Band spotted with crimson and yellow .... var. *cinereoides*, Dyar.

A distinct dorsal process on the metathoracic segment ..... *multiscripta*, Riley.

Walker* records " *C. bifida*, var. ?" from Hudson's Bay, and Butler† doubtfully refers a specimen from Mendocino Co., Cal., to *Cerura bicuspis*, Borkh., but it seems probable that these specimens belong to some of the American species, and at any rate these references are not positive enough to warrant the inclusion of the names in the list.

Cerura scolopendrina is known to me only by Boisduval's description, which is vague, and I have not included it in the table.

Cinereoides is a form of *cinerea*, as I have pointed out, and I consider *candida* as a variety of *scitiscripta* chiefly on the authority of Mr. Graef and of Dr. Strecker. Mr. Graef has shown me that there is no difference in pattern between the two, while Dr. Strecker assures me that they were " raised from the same lot of eggs."

THE MOOSE FLY—A NEW HÆMATOBIA.

BY WM. A. SNOW, UNIVERSITY OF KANSAS, LAWRENCE.

Entomologists will be interested to learn of the occurrence of a near relative of the Horn Fly, *Hæmatobia serrata*, in the middle of the great cranberry swamps of Northern Minnesota. These vast low areas extend for hundreds of square miles in the vicinity of the Lake of Woods. They are the favored home of the American moose, and the hope of obtaining some specimens of this animal for the museum of the University of Kansas led Professor L. L. Dyche of that institution to traverse these dangerous marshes. Professor Dyche has recently returned after remaining for over three months in the very centre of the swamps, camping upon the occasional sand ridges which cross the region; and to him I am indebted for specimens of a new *Hæmatobia*.

The flies were noticed first upon skinning the first moose, when a number of them were discovered in the animal's rectum, into which they had crawled for two or three inches in order to deposit their eggs in the excreta. The dejecta upon the ground were also found to contain hundreds of the eggs. Altogether nineteen moose were killed and in almost every case these flies were observed about them, remaining upon

*Cat. British Mus., Vol. IV., p. 985.

†Ann. and Mag. Nat. Hist., Vol. VIII., p. 317.

their carcasses as long as they lay unskinned, which was often twenty-four to thirty hours. For some time after the death of the animal, the *Hæmatobiæ* could be seen only with difficulty, concealed as they were by the mosquitoes which were incredibly numerous, lingering in clouds upon the dead moose as long as any of its juices could be extracted. The flies seemed to prefer the regions of the head, rump and legs where the hair is shortest. It is h that they find a resting place upon the horns of the mo moose go thrashing about in the underbrush with tempestuou They use their horns during a great part of the year to scrape away the b k from trees; and they have a way of winding them in among the bushes when a rival is near, as a challenge. The females, as is well known, have no horns. The present species is very probably indigenous, infesting as it does an animal not in domestication; and inhabiting such secluded inland portions of this continent. The moose obtained by this expedition were all killed far within the swamp, fifteen to twenty miles from firm land; and it is only in such places that this now rapidly disappearing animal can be found. This region is rarely visited by white men, and the few Indians that venture there wait until the surface of the fens is frozen over. It is not altogether unlikely that this fly infests the caribou also. It was hardly possible to observe its actions on the living moose; but we know that it lays its eggs in the excrement, and in all probability it resembles *H. serrata* in other habits as well.

Professor Dyche heard no complaints from owners of stock on the borders of the swamp of the ordinary Horn Fly, or of any similar fly. The cattle are, however, tormented with mosquitoes, and smudges are kept constantly burning to which they may run for relief.

Hæmatobia alcis, n. sp. Male.—Length 4–6 mm. Front narrow, with concave sides; central portion black with yellowish pollinose orbital stripes; sides of front further marked by a row of long, sparse, black hairs. Antennæ blackish-brown; second joint sub-globular; third joint slightly longer than broad, with square corners, and slightly concave on the inner side. Arista black, base enlarged. Pectinations long; sometimes one or two hairs on inferior side. Face and cheeks black, sparsely clothed with black hairs. Palpi long, porrect, gently spatulate, light yellow, with black hairs. Proboscis brownish-black. Dorsum of thorax greyish pollinose with yellowish tinge. Two very distinct black median stripes and an interrupted lateral stripe on either side. Thorax and

scutellum with long black bristles. Scutellum concolorous. Abdomen yellowish-grey pollinose, with black hair; a brownish-black median stripe, interrupted at the incisures; a pair of dusky spots on second and third segments, and sometimes also on the fourth. Legs simple, blackish-brown, except the yellow basal and immediate distal ends of femora and basal ends of tibiæ. Wings hyaline, somewhat dusky; base orange yellow.

Female.—Front wide and with straight sides. Hind femora light brown, except a subapical dusky band about one-third the length of the femur in width.

Nine males and ten females. The specimens are alcoholic, but in excellent preservation. They are now in the museum of the University of Kansas.

The following differences between *H. alcis* and *H. serrata* may be noted:—The former is larger. It has thin black pile on the cheeks, while in the latter the pile is golden and quite thick. The palpi of *H. alcis* are light-yellow in both sexes with no trace of black, except in the scattered black hairs. The stripes on the dorsum of the thorax are much more distinct. The legs differ considerably, being darker in colour; in the male they are blackish-brown, except the yellow basal and immediate distal ends of the femora, and basal ends of the tibiæ; the female has light brown hind femora varied by dusky bands near the distal ends. A more important difference, however, is the lack of the serrations which characterize the hind tarsi of the male *H. serrata*. Base of wings in the present species more broadly and brightly yellow.

Rondani defined the subgenus *Lyperosia*, to which *H. serrata* is referred, from two characters, namely: hairs of arista all superior, and anterior cross-vein opposite the termination of the first longitudinal vein. An examination of my specimens of *H. alcis* has discovered two with one or two hairs on the underside of the arista; and I may say, on the authority of Dr. S. W. Williston, that the relation of the small cross-vein to the end of the first vein in this and allied groups is very inconstant.

I have compared the present species with the descriptions of European species of *Hæmatobia* (except that of *H. irritans* which I did not have), and find that *H. ferox* approached it in some respects, but, brief as is the description, several important differences were noted.

CORRESPONDENCE.

REVISION OF THE GENUS AGROTIS.

Dear Sir,—A few words are called for by Mr. Grote's "remarks" in the March number of the CAN. ENT. The parts critical, of course, require no reply, and are really unexpectedly cordial; nor do the parts explanatory. Mr. Grote asks why *badinodes* and *insula*, instead of *herilis*, *badinodis* and *ins* instance it is occasioned by an original misreading and mistran the name, which had become so fixed that, often as I had seen and wri en the names, still persisted and prevented my seeing the error. I a bliged to Mr. Grote for pointing out these cases. Mr. Grote say ith regard to the classification of the group it is conducted upon t sis first suggested by myself, *i. e.*, the forms with unarmed fore-tibiæ are rated, and other divisions are based upon genitalia and sexual char ' He refers to the CAN. ENT., XV., p. 51, March, 1883. In 1857 Lederer had already used *all* the characters suggested by Mr. Grote, and the latter has made absolutely *no* original suggestions for dividing the genus. Nor has Mr. Grote, anywhere in the Noctuidæ, used or suggested *new* characters. He has written as though I had found the basis for such work as I have done, in his writings. I wish distinctly to state that this is *not* the case. Herrich-Schaeffer, von Heinemann, Lederer, and others, all used the same characters that Mr. Grote has used. I claimed no originality for these bases of subdivision, and no credit is due to Mr. Grote therefor. In the systematic study of the sexual characters in this genus and in the American Noctuidæ I do claim originality. Lederer did not get the clasper in any case, and used only the external form of the harpes. Mr. Grote does not give any evidence, anywhere in his writings, that he went even as far as Lederer in this direction. Mr. Grote knows the writings to which I have referred, as his earlier papers sufficiently prove. In reference to my citations of determinations made by him in collections, these are always to specimens bearing a label in Mr. Grote's own handwriting, and where a type is referred to, it means a specimen so labelled by Mr. Grote himself. I refer now to Mr. Grote's paper in the Proc. Am. Phil. Soc., June, 1883, p. 176, for the following:—"I conclude this paper by briefly referring to the fact that I have determined my species in many collections. I enumerate those of Mr. Thaxter, Mr. Neumœgen, Mr. Hy. Edwards, Mr. Tepper, and in the Albany collections. A large number of my types are in Mr.

Neumœgen's grand collection, and I have figured a good number of the species. There can thus be but few cases of doubt as to what I have described." All of these collections I have studied, and my references are to identifications made in them. I do not blame Mr. Grote for making errors, and had he not assumed so infallible a standard for himself in his criticism of others, would not have so often pointed them out. I am said also to have followed Mr Grote's synonymy or "adopted" it. Altogether 59 species have synonyms. Of these 23 are originally stated by myself, Mr. Strecker gives one, Mr. Butler is responsible in whole or in part for six, two of them are mere citations of preoccupied names, and of the older species the synonymy is "adopted" by Mr. Grote from Walker in several instances. This is not scientific literature by any means, and I regret being responsible for it, but I cannot allow Mr. Grote's statement "that I have at least laid down the foundation for its proper study" to go unchallenged. Mr. Grote's work in the North American Noctuidæ has been a necessary one, and has been largely drudgery. No one can better appreciate than I the labor involved in identifying material, naming and describing it. That he made synonyms was simply natural and unavoidable, and is in no wise to his discredit. I expect to make them myself, and have done so already. Our noctuids are far from completely known, and in the Agrotes alone will reach nearly 500 species. I know of more than 20 already that are different from any described in the monograph. Mr. Grote's earlier papers were, as a rule, careful and easy to work with, and so up to the period of Dr. Harvey's work. That Mr. Grote really described Dr. Harvey's species has been often told me; but it is interesting to have the statement from headquarters. Mr. Grote's work in the later period failed to equal the earlier papers, so far as value to the student is concerned, from the fact that he assumed in general that his readers knew the Noctuidæ just as well as he did himself. A brief indication, perfectly characteristic in Mr. Grote's view, was absolutely incomprehensible to one not so well grounded. Mr. Grote's work is essentially descriptive, rarely systematic, never monographic. His generalizations are often well put, interesting and valuable; but withal I have not found anywhere any "foundations" for monographic work that did not already exist in literature. Mr. Grote's correction of my reference to *insulsa* is just. I somehow overlooked the comparison to *repentis*. A specimen in Dr. Bethune's collection named by Walker, and agreeing with his description, is a species of *Hadena*, allied to *devastatrix* in maculation, but much darker and richer brown in colour, and is Mr. Grote's *H. ducta*. Walker's determinations are not reliable, and I do not say Mr. Grote is wrong.

JOHN B. SMITH.

NOTES.

WHOLESALE DESTRUCTION OF COLIAS PHILODICE.

In August, 1886, while visiting in Louisiana, Mo., I made frequent excursions to damp places along a neighboring brook in search of butterflies. It was the droughty season, and there were but a few stagnant pools, damp gravel beds, and mo[illegible]which insects could slake their thirst. At one of the last [illegible] I noticed a great bunch of Coliads (mostly *Colias philo...* [illegible]ccasional *Eurytheme*), and a few specimens of *Pieris rapæ*, which my ap[illegible]rance started and put to flight. As a few individuals did not take to wing, but seemed unable to rise though they fluttered violently, my curiosity was aroused and a closer investigation showed the bank and gravel bed below to be strewn with mutilated specimens of *Philodice*, scores of individuals, detached wings in some cases, in others the head and thorax [illegible]emained intact. Upon taking the struggling butterflies by the wings I found they were held firmly to the ground, their abdomens being drawn into the burrows of Tiger-beetle larvæ. They were being actually eaten alive by these voracious grubs. I found that the robbers after eating the softer parts of the butterflies cast the wings and harder parts away from their holes. Upon my retiring a few yards the thirsty butterflies returned and settled down to sip the moisture again. Those that alighted over the burrows were quickly seized by their cunning enemies, and the poor creatures could only flutter, unnoticed in their death struggles by their unsuspecting companions. I found the clay slope to contain great numbers of these holes or burrows, and the top of each hole displayed a dark head with a pair of ugly jaws, murderous assassins in hiding, thirsting for innocent blood!

R. R. ROWLEY, Curryville, Mo.

ERRATA.—C. E., Vol. XXIII., p. 34, line 8 from bottom, and p. 36, line 4, for "Lec." read "Sec."; p. 34, last line, for *Prioma* read *Prionia*; p. 35, line 6, for "Lilia" read "Tilia"; p. 35, last line, for "Basidomycetons" read "Basidomycetous"; p. 36, line 15, for "Lilia" read "Tilia."

R. THAXTER.

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* * * The Editor craves the indulgence of his correspondents, as he has met with a severe domestic affliction in the loss of his daughter, AGNES EMILY BETHUNE, who died on the 2nd of March in the twenty-second year of her age.

Mailed April 7th.

The Canadian Entomologist.

VOL. XXIII. LONDON, MAY, 1891. No. 5.

SILVER-TOP IN GRASS AND THE INSECTS WHICH MAY PRODUCE IT.*

BY HERBERT OSBORN, AMES, IOWA.

The common affection of various grasses, commonly known as "Silver-top," has received the attention of such well-known investigators as Professors Comstock, Lintner, Forbes, Fletcher and others, and it is not with the expectation of completely solving the problem which has perplexed these careful students that I venture to present my experience, but in the hope that by comparisons of experience and observation we may arrive at a better knowledge of a subject at once important and complex.

The appearance of affected grass has been often stated and can be described briefly as a whitening of the upper portion of the stalk of grass, especially the head, which withers without maturing seed, while the basal portion is shrivelled. The causes assigned for this whitening have been various, but, I believe, generally referred to the injury produced by some kind of insect operating at the base of the terminal node of the stalk.

The various observations upon the insects suspected of causing the injury, or found associated with it, are admirably summed up by Mr. James Fletcher, Entomologist to the Dominion of Canada, in his report for 1888, pp, 59–62. Briefly, the species credited with the most certainty so far have been species of *Meromyza*, *Chlorops* and *Thrips*, while Mr. Fletcher mentions suspecting species of Hemiptera, and records an attempt to produce Silver-top by caging such Hemiptera (species not designated) upon grass plants.

The species which can perhaps be considered as having been most positively connected with the disease is a *Thrips* called *Limothrips poaphagus* by Prof. Comstock, and while, as will be shown later, I feel certain that but little if any of the trouble which has come under my

*Read before the Society for the Promotion of Agricultural Science, Indianapolis, August, 1890.

own observation can be due to this insect, I wish to state beforehand that I have no thought of discrediting Prof. Comstock's observations, or questioning the ability of the *Thrips* he describes to cause all the injury credited to it. It is evident, upon slight examination of the subject, that the same appearance of the grass may be produced by very different agents, provided they attack the same point in the stem. Any injury to the juicy base of the ... cuts off the flow of the sap to the head during a certain ...vth must produce the withering and whitening so conspic... ed fields. Starting with this premise it is reasonable to conclude t... the trouble *may* result from a number of different agents, and such, I b... eve, to be actually the case as a result from the sum of my observations here presented.

During the past two seasons I have examined with care a great number of affected stems, usually with th... aid of a hand lens. For the season just past my observations in t... field were interrupted, shortly after the appearance of Silver-top, by a trip to Washington. But while absent I had a graduate student collect as many of the whitened stalks as he could and place them in alcohol, and these have been examined also so as to make the observations extend through as much of the season as possible. In a very few cases I have seen evidence of fungi present in the shrivelled base of the withered node, but so very few and in such cases so evidently a consequent of the injury that I do not think it can be credited with any of the damage.

In a very small proportion of cases I have found *Thripiæ* present in the injured part, and in so few when the greatest care was taken to get stems that were but just beginning to show injury, that I feel forced to abandon the view that these are the principal agents in the injury here. Dipterous larvæ have been still less frequent and I feel positive that only an exceedingly small part of the damage for the region studied can be referred to them. Moreover, I think that in fully ninety per cent. of the stems examined (so many examinations have been made at odd times during my walks, and in spare moments, that no exact percentage can be given,) no insect of any kind was found to be within the sheath of the injured stem.

Punctures of insects have been noticed in great abundance on the parts of the plant around these injured parts, and in many cases evidence of the puncture of the succulent portion itself was apparent. The character of these punctures agreeing closely with those known to be

made by various species of Homoptera affecting the same plants, and the conclusion that these insects are responsible for a part at least of this injury seems to me to be very strongly suggested, though not demonstrated.

There is no question whatever that these Homoptera puncture grass, both blades and stems, to procure their food. This is shown by the numerous punctures and deadened spots on the leaves and stems, and can be verified by watching the insect itself. That the puncture of the stem just above the joint so as to enter the succulent base of the terminal node, and the extraction of the sap from that part, would cause their shrivelling and the consequent whithering of the node above, seems sufficiently evident.

Knowing the habits of these insects, and considering the fact of their actual occurrence on the injured plants and the presence of injured spots, such as these insects make in getting their food, there seems to me no reasonable doubt of the *possibility* of these insects causing all the damage observed. The difficulty, in case we accept this view, is to explain why Silver-top is not more abundant than it is, or that such experiments as that by Mr. Fletcher in caging Hemiptera on grass did not produce it, for these insects swarm on almost every blade of grass. These insects, however, work on leaves and stems all the way from the surface of the ground to the tip, and their punctures are distributed promiscuously over all their surfaces. In stiff leaves and sheaths as well as in the stems above the succulent basal portion the shrivelling is confined to the few cells immediately surrounding the puncture, but in case the beak is thrust into the succulent part the effect is to kill the cells of an area through which all the sap for the nourishment of the upper node must pass, and, hence, the more conspicuous effect.

Some of my observations, moreover, show that this injury is not confined entirely to the upper joint, though always most conspicuous in the whitened head, but I have found the stem affected in lower nodes, and in some cases almost to the ground, in which cases also some of the upper leaves show the whitening effect of the injury.

The species of Homoptera most likely to be concerned in this work, are the common species of *Deltocephalus*, especially *inimicus debilis*, etc., which are serious grass pests, in any case, from their attacks upon the stems and leaves, and which I have recorded in some detail in a recent report to the Division of Entomology.

If correct in the opinion that the greater part of this injury where I have observed it is due to these insects, the matter of applications for their destruction becomes much easier, as we then have to deal with insects exposed to destructive liquids, or to destruction with "hopper dozers" and similar contrivances.

My argument in brief i- [illegible] top" may be produced by a number of different insects- [illegible] made by Mr. Fletcher. It may result from the action of [illegible] the sheath, or from puncturing and sucking of sap by insects [illegible] ate from the outside. In my own observations but a very small percentage of affected stems have contained insects of any kind within the sheath, and many show clearly evidence of puncture from without.

The species most abundant in the affected fields, and known to puncture grasses, are mainly *Jassidæ*. These insects are sufficiently abundant, and their habits entirely in accord with the injuries noted. No other insects of sufficient abundance, and with habits to make it probable that they could cause the injury, have been found in the silver-topped grass.

I conclude, then, from all the observations made so far, that for the locality studied, Homoptera (mainly *Jassidæ)* are the principal causes of the disease. The insects are open to general attack, and Silver-top should be prevented by their destruction.

[The attention of Canadian observers is invited to this important subject. The appearance known as "Silver-top" has increased enormously in some districts during the last few years. In many cases examined the cause could not be ascertained.—Ed. C. E.]

SOME RARE LEPIDOPTERA TAKEN NEAR MONTREAL.

BY A. F. WINN, MONTREAL.

Thecla laeta, Edw. I was fortunate enough to take a female of this rare and beautiful butterfly on the top of Beloeil Mt., 22 miles east of Montreal, on May 24th, 1888. I again visited the place on the same date in 1889 and 1890, but on both occasions the weather was too cloudy for anything to be on the wing.

Thecla acadica, Edw. I took two specimens at St. Rose, July 7th, 1889, flying over a field of oats, among which there was a quantity of wild mustard in flower, and the butterflies visited the latter occasionally, but only for a moment, and then dashed off.

Thecla strigosa, Harr. Very rare some seasons, and rather common others. Flies in the beginning of July, and frequents the flowers of Asclepias and Apocynum.

Pamphila leonardus, Harr. One specimen (♀) taken on the flowers of Golden-rod, September 7th, 1890. The first I have taken.

Dilophonota ello, Linn. I have been given a specimen of this "visitor from the south," that was found in the grass on McGill College grounds about the end of September, 1886. This is an interesting capture, as the date agrees exactly with captures in Ontario at London, Hamilton, and Dundas, already recorded in the CANADIAN ENTOMOLOGIST.

Crocota Treatii, Grote. One specimen taken at rest on the trunk of an oak, July 6th, 1889.

Dryocampa rubicunda, Fabr. This is recorded as being very rare in this province (CAN. ENT. VI., 220; VII., 109); but since the introduction of electric lights in our streets a number have been taken every season.

Thyatira pudens, Guen. One specimen found at rest on a lamp post, May 13th, 1889.

Charadra deridens, Guen. I bred a specimen of this moth Feb. 21st, 1889. The larva was found on oak, and agreed exactly with the "unidentified larva" described in Vol. XVIII., p. 124 of the CAN. ENT. Last September I found two larvæ on white birch, but not having enough boxes with me to keep all the species of larvæ separate, I put a *Notodonta* larva in the same box, and when I reached home I found that both my *deridens* had been bitten to death.

Syneda Alleni, Grote. Two specimens, 1889, one taken at Cote St. Antoine, flying at noon, June 30th; the other in the city, about the middle of July, by light.

Marmopteryx strigularia, Minot. I took this species in large numbers in a maple grove near St. Therese, on August 31st, 1890. They seemed to be confined to this place, as in the fields surrounding the wood none were seen, but as soon as the woods were entered they flew up from the trees by dozens to settle again a few yards off on other maple trunks. When at rest the wings were invariably closed over the back like those of a butterfly, showing the beautiful marbling of the under surface.

SOME INDIANA ACRIDIDÆ.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

(Continued from page 81, Volume xxiii.)

22. MELANOPLUS FEMUR-RUBRUM, De Geer. The Red-legged Grasshopper.

Acrydium femur-rub . Inj., 1862, 174, fig. 80.
Caloptenus femur-rub n. Acrid. N. A., 1873, 163.
— Rep. St. Ent., Ill., 1880, 124, 22, 23.
Ri p. U. S Ent. Comm., I., 1877, 30, pl. II.
Melanoplus femur-rubrum, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX., 1878, 284.

Our most abundant and injurious species found everywhere during the autumn months, but prefers open blue grass pastures and roadsides. Males and females of this species, as well as of the next, were taken in copulation as late as November 22. When disturbed it either hops vigorously to one side or flies swiftly and noiselessly straight ahead for about twenty feet and then suddenly drops to the ground.

23. MELANOPLUS ATLANIS, Riley. The Lesser Grasshopper.

Caloptenus atlanis, Riley, Rep. U.S. Ent. Comm., I., 1877, 49, pl. II
Id., U. S. Agr. Rep., 1883, 172, pl. II.
Thomas, Ninth Rep. St. Ent., Ill., 1880, 124.
Melanoplus atlanis, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX., 1878, 285.

This species is fully half as common as *femur-rubrum*, and is found in company with it, the habits of the two being essentially the same. The notched apex of the last abdominal segment of the male of *atlanis* readily distinguishes that sex from the corresponding one of *femur-rubrum*, but the females are very similar and more difficult to separate. However, a little practice will enable one to distinguish them, even in the field, by colour characters alone, the abdominal sternites of *atlanis* being yellow, while those of *femur-rubrum* are dark reddish brown. Moreover, the upper outer surface of the posterior femora of the former are banded with three oblique yellowish bands, those of *femur-rubrum* being plain.

24. MELANOPLUS COLLINUS, Scudder.

Melanoplus collinus, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX., 1878, 284.

Six males of the above species, which Mr. Scudder states has not been heretofore recorded as being found west of New England, were taken on Oct. 25, from shady places along the bed of the old Wabash and Erie Canal. I was not able to distinguish the females from those of *femur-rubrum* and *atlanis*, with which the ones taken were in company. The males are readily distinguished from those of *femur-rubrum*, which Indiana species they most closely resemble, by the following characters: The average size is less; wings shorter, not reaching tip of abdomen; elytra with fewer and smaller spots, and by *having the anal cerci forked at the tip.*

25. MELANOPLUS DIFFERENTIALIS, Thomas. The Lubberly Grasshopper.

Acridium differentialis, Thos., Trans. Ill. St. Agl. Soc., V., 1865, 450.
Caloptenus differentialis, Id., Syn. Acrid. N. A., 1873, 166.
Id., Ninth Rep. St. Ent., Ill., 1880, 127, fig. 24.

A very common species along fence rows and borders of cultivated fields, especially in the Wabash river bottoms, where they feed upon the greater ragweed, *Ambrosia trifida*. On Oct. 2 hundreds were seen along the edge of a field of lowland corn, the leaves of the marginal rows of which they had almost wholly destroyed. When a stalk was approached, they did not desert it, but dodged quickly around to the opposite side, much as a squirrel does around the trunk of a tree when pursued. If, however, one took alarm and jumped, all the others in the immediate vicinity did likewise. The females of this species become exceedingly dark, sometimes almost black, with age, whereas the males are but little changed.

26. MELANOPLUS BIVITTATUS, Say. The Yellow-striped Grasshopper.

Acridium flavo-vittatum, Harris, Ins. Inj., 1862, 173.
Acridium bivittatum, Thos., Trans. Ill. St. Agl. Soc., V., 1865, 449.
Caloptenus bivittatus, Id., Syn. Acrid. N. A., 1873.
Id., Ninth Rep. St. Ent., Ill., 1880, 126.
Melanoplus femoratus, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX., 1878, 284.

This usually abundant species is rather scarce in Vigo County. It frequents meadows, especially those of clover, and open pastures, and like *C. differentialis*, uses its wings but little in moving from place to place, relying upon its enormous leaps to carry it out of danger.

TETTIGINÆ.

27. TETTIX ORNATA, Say. rouse Grasshopper.
Tettix ornata, Thos., ., 1873, 183.
Tetrix dorsalis, Harr., , 186.
Tetrix bilineata, Harr., loc. cit., 186.

Numerous specimens of this genus were taken which varied exceedingly in size and coloration, but which, under the present confused state of the literature at command, are all referred to the above species. They frequent the edges of dry, open woods, ere they were quite common during the warm afternoons of October a November.

28. BATRACHIDEA CRISTATA, Harr. The Crested Grouse Grasshopper.
Batrichidea cristata, Thos., Syn. Acrid. N. A., 1873, 190.

Rare. Four or five specimens were found in company with the last named species. It is not mentioned in either of Thomas's Illinois lists, and I can find no record of it west of New England.

29. TETTIGIDEA LATERALIS, Say. Black-sided Grouse Grasshopper.
Tetrix lateralis, Harris, Ins. Inj., 1862, 187.
Tettigidea lateralis, Thomas, Syn. Acrid. N. A., 1873, 187.

Very common and variable in colour; frequenting the same localities as the last two species.

30. TETTIGIDEA POLYMORPHA, Burm. Small-winged Grouse Grasshopper.
Tettigidea polymorpha, Thomas, Syn. Acrid. N. A., 1873, 188.
Tetrix parvipennis, Harris, Ins. Inj., 1862, 187, fig. 82.

As common as the preceding, and found with it.

The Grouse Grasshoppers are the only *Acrididæ* which, with us, hibernate in the perfect state. They have often been taken by the writer in midwinter from beneath logs and the bark of stumps, and on warm days in early spring they are very frequent on hillsides which have a southern slope. Dr. Harris well describes their movements when he says:—"They are extremely agile, and consequently very difficult to capture, for they leap to an astonishing distance, considering their small size, being moreover aided in this motion by their ample wings."

NOTE ON GRAPHIPHORA, HUBN.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

On page 92 of the Bulletin U. S. N. Museum, No. 28, Prof. Smith says: "Mr. Butler says *augur* is the type of *Graphiphora*, Ochs., in which case the application of the name to the *Taeniocampa* series by Mr. Grote would be unwarranted." I never fixed the type of Ochsenheimer's genus *Graphiphora*. What I did was to fix the type of Hübner's genus *Graphiphora* (see Check List, Part II., 1876, p. 37). Hübner proposes the name in the Tentamen for *gothica*, which, as it is the only species given, is therefore the type. Afterwards, in 1816, Ochsenheimer, 4, 68, includes *ravida* and 16 species not separable from *Agrotis*. Hubner's type, *gothica*, Ochsenheimer includes under *Episema*. By what process Mr. Butler assumes *augur* as the "type" of Ochsenheimer's genus is unknown to me. In any event Hübner's genus *Graphiphora* has precedence for *Taeniocampa* of Gueneé.

I may here also correct a misapprehension of Prof. Smith's with regard to the use of *vetusta* by Mr. Walker. On page 212, l. c., Prof. Smith says: "Mr. Grote has suggested that this (*i. e.*, *Agrotis vetusta*, Walk.) may be the same as *muræ nula*, G. & R., but this can scarcely be so if the description is at all to be relied upon." In reply I would say that I never suggested that *Agrotis vetusta*, Walk., was = *muræ nula*, but that *Mamestra vetusta*, Walk., might be that species (see Essay, p. 43.) It appears that Walker has two *vetustæ*, consequently Prof. Smith's apprehension that *muræ nula* may come to be discarded for either of them, proves groundless.

From an examination of Walker's type of *Mamestra insulsa* I came to the conclusion that it was probably an *Agrotis*. Prof. Smith says, Bulletin, p. 209: "Mr. Grote, whose reference of the species to *Agrotis* has been followed, gives no suggestion as to the species it most resembles, or where its allies are to be found." On page 43 of the Essay, where I make the reference, I say: "The specimen (from Canada) is evidently an *Agrotis*, allied to *Repentis*, and unknown to me."

ON THE OCCURRENCE OF TWO SPECIES OF COLEOPTERA NEW TO MONTREAL.

BY J. F. HAUSEN, McGILL COLLEGE, MONTREAL.

Platynus crenistriatus, Lec. I took a specimen of this interesting little beetle (fig. 1) here la[illegible] the foot of a stump. It is not [illegible]ance certain small *Pterostichi*, but [illegible]ce distinguished by having the elytral [illegible]hind sinuate and simple, without the interruption and route fold usually seen in *Pterostichus*. It seems to me to be, in fact, one of those less specialized forms still exhibiting characters common with some species of that genus. The form is convex, black and shining, with the elytral furrows deep and strongly punctured, feet and three basal joints of the antennæ bright yellow, the external margins of the elytra and edge of the prothorax beneath piceo testaceous. Whether it is common elsewhere I know not, but it is the first specimen I have yet met with here. It seems of rather wide distribution, as the specimens from which Leconte originally drew up his description (New Species of Coleoptera, p. 9, 1863,) were obtained from Illinois.

FIG. 1.

I took with this an example of another singular *Platynus* not usually found here, and which Dr. Leconte has replaced under the old name under which it was described, namely, *Anchus pusillus*, Lec. Specimens are also in my collection from St. Jérome, P. Q., and Northern Vermont.

FIG. 2.

Some time since I was handed, for identification, by one of the members, a little

longicorn I did not at first know, but which on closer examination proves to be a specimen of *Gracilia minuta*, Fab. (Fig. 2.) My friend, Mr. Caulfield, who has very kindly placed all his specimens in my hands, states it was taken emerging from a barrel of some kind of dye, and it is probably introduced from Southern Europe. Superficially it resembles somewhat one of the *clytini* and, in fact, Schiödte placed it immediately after *clytus*. (Class. Cramb. Dan. Faun., Natur. Hist. Tidsskrift, 1864, S. 3. V. 2, p. 483.) But the slightly depressed elytra, corneous ligula, not finely granulate eyes, etc., would point to its being perhaps more properly placed in *Œme* of *cerambicini*. For the benefit of those who may not know it, and especially as it does not appear, so far as I am aware, to have been before recorded from Canada, it may be well briefly to describe it.

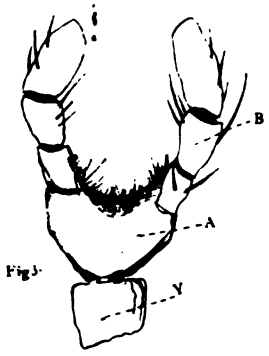

Fig 3.

The figure (2) it is hoped will convey some idea of its general form. It is of a uniform reddish brown, the legs being somewhat lighter, with rather sparse cinereous pubescence giving it a hoary appearance. The antennæ are ciliate and the head, thorax and elytra furnished with flying hairs. Rather variable in size, .18–.27 in. Leconte states (Jour. Acad. Nat. Sc. Phila., 1850, pt. 1, p. 24) he could find no difference between his specimen and those from Europe. As somebody may have it under a different name, I will give the synonyms: *G. minuta*, Fab. = *pygmæa*, Fab. = *fusca*, Hald.

Fig. 3 represents the labium (A) the ligula and paraglossæ being in this case confused and indistinct; B latral palpi; Y basal membrane of labium.

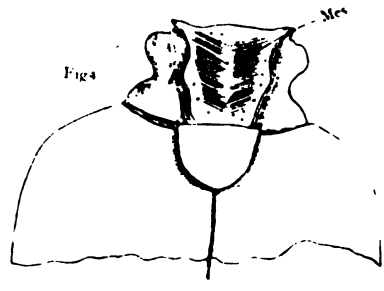

Fig 4

Fig. 4 shows the mesonotum which is large, glabrous, margined at sides and covered with stridulating surface consisting of extremely fine transverse lines.

LIMENITIS ARTHEMIS, ETC.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

The paper by Mr. W. H. Edwards in the March number of the CANADIAN ENTOMOLOGIST brought back to me vividly my collecting days in the Catskills, and as I have also taken *arthemis*, *proserpina* and *ursula*, perhaps my exp[illegible] be entirely uninteresting. It was sixteen years ago that [illegible]wo weeks' tramp in the mountains, and as it was my first e[illegible]h them, the memory of that trip is yet more distinct than of m[illegible]equent excursions. I arrived at Catskill village soon after sunrise, [illegible]before noon was close to the foot of the mountain. I saw more b[illegible]ies there than I had ever seen at any one time before, and gathe[illegible]a large harvest, of *Argynnids* more especially. *Limenitis urs*[illegible]undant, but as this was already an old acquaintance, I captured onl[illegible]uch as offered themselves too temptingly. My objective point for that [illegible]y was the Mountain House on the summit, and soon after I started the climb I noticed that *ursula* became smaller, and had an odd look somehow. I took a few, and above the Rip Van Winkle House began to take *arthemis*, and saw no more *ursula*. I stopped at the Rip Van Winkle, deeming it a good collecting centre, and stayed there a week. On the second day a colony of ants invaded my room, and before I discovered them, destroyed a large part of my first day's collecting. I threw away all the *ursula*, but saved some of the odd-looking specimens which had suffered little, and these proved *proserpina*. I took *arthemis* on the top of the mountain, but no more *proserpina*. Had I known the insect, I could no doubt have captured many, lower down the road, but I never tramped that way. In five different, not consecutive years thereafter, I visited the Catskills, but made Lexington, only a few miles—six, I believe—west of Hunter, my stopping place. This is about 2,000 feet above sea level, though lower than Hunter. To reach it from the U. & D. R. R. meant a 13 mile drive from Shandaken through the "notch," which is nearly a duplicate of Stony Clove. In this "notch," which I often visited, I took many a good insect, and it was a reliable locality for *arthemis*. They were very abundant always, though rather shy; but I never found *proserpina* during the five years I collected there. But on the other hand I took *ursula* on both sides of the pass, both at Shandaken and at Westkill, and along the banks of the Schoharie at Lexington. There is no doubt, therefore, that

ursula gets within a very few miles of Hunter, and that to reach Stony Clove it would not be necessary for it to come from the Hudson Valley. There are no natural obstacles to prevent a direct flight over the Schoharie to Hunter. Through Stony Clove I have been only once, and that by rail on my last visit to the mountains, when I did no collecting.

As to the standing of *proserpina* I have no opinion to offer.

Mr. Edwards, on p. 55 in the note, makes some remarks on the value of genitalia in determining species. On this point I have very decided opinions. By his suggestion that "some seem to have shrunk in the drying, others perhaps are done from the green subjects, and are full and plump," Mr. Edwards shows that he has never looked into the matter himself at all, else he would know that the structures are chitinous and cannot shrink any more than the antennæ, palpi or legs. The preparation from the recent specimen, and that from one fifty years old, would be alike in the same species. Do the parts vary? Decidedly no, or to so slight an extent as to be scarcely appreciable. I have examined dozens of specimens of some of our common noctuids, and found no variation, however much the maculation differed. In my study of the *Lachnosterna* many hundreds were examined, some specimens a dozen years old, others just killed, and the correspondence was absolute. Do they help us distinguish species? Also, decidedly yes. But this needs qualification. Identity of sexual structure does not necessarily mean identity of species; but on the other hand, difference in sexual structure *always* means difference of species. I have found these structures of the utmost value in the *noctuidæ*, and in some genera that I have studied would not hesitate to determine species from the genitalia alone. In *Lachnosterna* I would agree to name any species of either sex from the genital structures where it is one of the species I have figured.

But Mr. Edwards is right in one respect. Sometimes the character fails, and in an entire genus all the species will be practically alike. My revision of *Agrotis* illustrates that most strikingly. In this, however, the character shares with many another the burden of want of universal application, and we must use it as far as it goes. In the noctuids it is most valuable in separating closely allied species, and it often determines for me the rank of a form when the other characters leave me in doubt. I believe that all who have carefully studied these characters are convinced of their importance and high value in specific separation.

NOTES ON THE LIFE HISTORY OF ECPANTHERIA SCRIBONIA, STOLL.

BY HARRISON G. DYAR.

The preparatory stages of this species do not seem to have been described. Mr. Hy. Edwards in his catalogue gives eleven references, but in none is the egg [illegible] but a single larval stage, and in only one the pupa. It [illegible] ot be amiss to briefly describe the several stages here. [illegible] first to call attention to the remarkable fertility of the insect [illegible] on, at least in Southern Florida where I met with it. In Psy [illegible] II., p. 364, Mr. Krancher cites an example of an European m [illegible] *mpa quercifolia*, that laid 580 eggs, and seems to consider [illegible] ial number, as it doubtless is; but my example of *Ecpantheria* [illegible] *ia* laid nearly four times as many.

The moth was bred from a [illegible] ound at Palm Beach on Lake Worth, Florida, and emerged from pupa Feb. 4, 1890. As it was a female and crippled, the wings having failed to develop properly, I tied it out over night and the next morning found it mated with a male of the variety *denudata*, Slosson. On the evening of Feb. 6 it began to deposit eggs on the sides of the box in which it was confined, and during the night laid about 400 eggs. Every night after this it laid eggs till the night 10–11 February, after which it died. The total number was 2,274 as nearly as I could count them.

Egg: Nearly spherical, the base a little flattened, all minutely punctured; colour yellowish pearly gray; diameter .8 mm. Duration of this stage about five days.

First stage: Head light brown, paler in front; ocelli large, black; width .5 mm. Body pale whitish, except the first and central abdominal segments (joints 5, 6, 9, 10 and 11) which are light brown. The warts are arranged as usual in the *Arctiidæ*,* concolorous, the bristles black. Length about .2 mm. Duration of the stage four days.

Second stage: Head nearly colourless, shining, tinged with brown; ocelli large, black; mouth parts brown; width .7 mm. Body nearly concolorous with the head, not shining, tinged with reddish brown. The warts of rows (1) and (2) (the trapezoidal warts) on joints 5, 6 and 9–11

*As in *Arctia*, *Leucarctia*, *Spilosoma*, *Hyphantria*, *Arachnis*, etc, but not as in *Halisidota*.

black; hair black. Later the body becomes more brownish, blackish around the black warts and a pale dorsal line is seen. This stage lasted four days.

Third stage: Head semi-transparent, pale brownish; a darker shade at the vertex; maxillæ reddish; ocelli black; width .9 mm.; cervical shield and legs black; body light reddish brown except the dorsal warts on joint 4, joints 5 and 6 entirely, and joints 8, 9, 10 and 11 in the subdorsal space, which are black; a white dorsal line; bristles spiny and sharp, black. Duration of the stage six days.

Fourth stage: Head shining pale brownish; the mouth parts paler; ocelli black; width 1.4 mm. Body reddish orange with a slightly paler dorsal line; joints 5, 6 and 9–11 are black, the latter in the subdorsal space only, and most of the warts are black. The length of the larva is about 10 mm. Duration of the stage six days.

Fifth stage: The markings of the mature larva are now assumed. Head brown, blackish in front; ocelli and inside part of the jaws black; labrum and antennæ pinkish; width 2 mm. The body is marked as in the mature larva, black with transverse vermillion bands, except that there is a faint pale dorsal line anteriorly.

Sixth stage: As in the preceding stage. The width of the head is 2.8 mm. and the dorsal line is reduced to a mere trace. Feet reddish and spiracles ochre.

Seventh stage: Head irregularly black in front, brownish at the sides and vertex; mouth parts and antennæ reddish; width 4 mm. Body as in the mature larva, except that the transverse bands are lighter red. Length of larva 45–60 mm. Duration of the stage nine days.

Eighth stage: Head brownish black with a pale line in the suture at vertex and a pale spot on the side posteriorly; labrum and antennæ salmon colour; jaws brown; width 5.3 mm. Cervical shield straight in front, curved behind, bisected by a pale line; body velvety black except a transverse vermillion band on each segment in the intersegmental incisures on joints 5–11 inclusive, concealed when the body is contracted. Thoracic feet brownish red, abdominal feet brown, the lower part salmon colour and the claspers whitish; spiracles dark orange; bristles spiny and sharp, black. Length of larva 85–95 mm. at maturity. Duration of this, the last stage, eleven days.

Cocoon: A thin netting of yellowish silk just as in *Arachnis picta*. The drops at the joinings of the threads are yellow like little amber beads.

Pupa: Robust, of normal shape; on the abdominal segments, dorsally and subventrally are ten rows of large tufts of short spiny hairs, the tufts smaller ventrally and less numerous posteriorly; cremaster, two tufts of reddish spines tr[illegible]. Colour black, reddish in the abdominal incisures; the [illegible] and dull, the wing cases more shiny, creased. Spiracles linear, [illegible] Length 35 mm., width 13 mm. Duration of this stage twenty-[illegible]

Food plants: The larvæ [illegible] the ground or ascend shrubs or small trees and eat whatever [illegible] their way, if it is not too coarse. My specimens were fed princ[illegible] a species of Spurge (*Euphorbia cyathophora*) and Castor-Bean [illegible] *communis*).

ENTOMOLOGICAL SOCIETY OF ONTARIO.

THE GEOLOGICAL SECTION of the Society was formed in May of last year, and at the Annual Meeting in August was regularly constituted a branch of the Society. The members are as follows :—Dr. S. Woolverton, President; Thos. Green, Vice-President; J. L. Goodburne, Secretary; and Messrs. B. Green, W. J. Carson, Alex. Marshall, W. Percival, Geo. Burrell and M. Scarrow. The course of study taken up was Sir Charles Lyell's work, which proved of much interest and benefit. Discussion sometimes waxed exceedingly warm, exception being taken to many of the positions erected by various writers; this, however, had a good result, as the discussions caused the subject-matter to be well understood by all. Specimens obtained in the district about London were exhibited at the meeting, and much patient research was sometimes necessary in order to identify examples of obscure fossils, not, however, without a few mistakes, which in the main were subsequently set right.

The members had regular excursions, Friday and Saturday of each week being generally devoted to this—probably the most interesting part of geological study, and not a week passed without some new specimens being placed upon the tables of the entomological rooms. The district around London was well worked up, especially in the vicinity of Springbank. In addition to this trips were made to St. Marys and Arkona, many specimens being brought home from both places.

Taken altogether the year's work has been very satisfactory to the members and interest has not flagged at any time, each member seeming anxious to do what he could towards adding to the interest.

MEETING OF THE LONDON ORNITHOLOGICAL SECTION.—The March meeting of this section was held on the evening of March 2nd, in the rooms of the Entomological Society. After routine business, the monthly list of species observed was taken up resulting in the addition of the following ten species for February, with a total of seventeen species observed during the month:—Goldfinch, Robin, Bufflehead, Great Horned Owl, Great Northern Shrike, Song Sparrow, Bluebird, Junco, White-winged Crossbill, Mottled Owl. The chairman reported that a specimen of the Great Carolina Wren had been received by one of our members, Mr. L. H. Smith, from Forest. This is the first record of its occurrence in Canada. Mr. Stevenson remarked on the abundance of the Snowy Owl in this vicinity during the present winter, about eight or ten having been heard of by members of this section, all seen or taken in the county of Middlesex. The chairman reported the capture of a Bohemian Waxwing in September, 1890, by Mr. Harry Gould, while feeding in a wild cherry tree in company with some Cedarbirds. This appears to be the first record of its occurrence since about 1878, when Mr. W. Hines captured a few in the city in midwinter.

CORRESPONDENCE.

HALISIDOTA TRIGONA.

Dear Sir,—In reply to Mr. Dyar's note on p. 43, I would say that I compared my type with Herrich-Schæffer's figure of *specularis* from Brazil, and arrived at the conclusion that the two closely allied forms were distinct species. In one of my papers (Tr. Kans. Ac. Sci., p. 65,) I gave the differences observed: "Closely resembles the Brazilian *specularis*, H.-S., fig. 59. It differs by the smaller size of the vitreous spot, the outer edge of which is farther from the external margin and more even. The Brazilian species wants the yellow terminal shade line (from the figure). There is a great resemblance between the two widely geographically separated forms." Mr. Dyar says: "I have compared Mr. Grote's description with H.-S. figure, and there is no doubt but that the two refer to the same insect." The "doubt" I have grounded as

above cited, and, without further evidence than appears, Mr. Dyar's synonymical note is not justified. It is at least previous to the necessary comparison of Brazilian and North American material. Probably our species is distinct, as there are other cases of allied but distinct North American and Brazilian moths, such as *Hepialus auratus* and our common *Orthodes* recently separated by Mr. Butler from the Brazilian *infirma*.

A. R. GROTE.

ATTRACTING BUTT[illegible] IN COLORADO.

I had generally considered [illegible]*indra* to be a rare insect in Colorado, and from the inquiries [illegible]spondents would think it wanting in many collections. While [illegible] at about 7,000 feet elevation, in June, '89, I occasionally saw on[illegible]t me like a flash up the mountain sides; but one sultry afternoon I took several examples in a narrow canon as they sat upon a small piece of sandy ground that had been soaked by a thunder storm in the morning. I acted on the hint thus given, and kept the place well moistened with water from the creek near by, and visited it frequently during the week I was in the vicinity, with the following result:—

Papilio indra, 65 examples.
P. zolicaon, 1.
P. eurymedon, 3.
P. daunus, 10.
Anthocharis olympia, 5.
Argynnis edwardsii, 2.
A. halcyone, 5.
Chionobas uhleri, 4.
Lemonias nais, common.
Nisoniades tatius, 3,

and several common species in abundance. The "Section Boss" of the railroad used to go past frequently, and he got quite interested with my pursuit. I remarked to him one day, I thought it odd I did not attract butterflies on the other places I watered. He said: "Well, it does seem kind o' queer, and I buried a mule in that very spot last fall."

DAVID BRUCE, Brockport, N. Y.

SOME OBSERVATIONS ON THE COLLECTING OF 1890.

A combination of causes prevented me from doing my usual amount of hunting around Hamilton last summer, and the reports of the collectors there left with me the impression that I was not losing much. I took many a stroll through the city, looking for, and expecting to find something, but invariably returned disappointed.

I suspect that electric lights and sparrows are working a revolution in city collecting. I was informed by a collector, whose duty takes him out early in the morning, that unless he got to a light that was in close proximity to his work before the sparrows, he got nothing; that they know the location of all the lights as exactly as the City Engineer, and when they have cleaned up one, they make straight for another; and they are not content to take merely what is on the ground, but will flutter up and down the pole, and pick off what is at rest on it; or perched on top of a fence, they will survey carefully all below them, and the instant they see an insect, they drop to a level with it, pick it off, and mount the fence again to devour it.

The communications from other parts of the country, which I have received since the season closed, indicate a general disappointment with the result of the collectors' labours.

On the 7th of June I went on a visit to the country, about sixteen miles south of the city, staying to the 23rd. The weather was warm—the first steady heat of the season. There was a bit of open woods close at hand, to which I was a constant visitor, and found hunting there specially interesting and profitable,a goodly number of different Lepidopters almost daily emerging.

Edema albifrons was in surprising numbers. Look in any direction, and the eye would light on several of them sitting in their own peculiar attitude when at rest, the wings rolled tightly round the body, the front legs straightened out beneath them, supporting the forward part of the insect at an angle to the object it rests on, the lime-grey colour of its wings, and the light coloured, brown margined, singularly truncated head end, giving it an exact resemblance to a bit of rotten twig sticking out from the side of a tree.

Another plentiful thing was *Heterocampa guttivitta;* what most drew my attention to this insect at this time, was the large proportion of deformed ones. We are often disappointed in rearing insects in confinement, by having some of them deformed, and are apt to attribute the deformity

to the confinement; but this species in nature gave a larger proportion of deformed specimens than I ever got from all my rearing in confinement. *Lunas* were very abundant. I took one dozen, and could have taken three. I found several of them in a badly crippled condition, one particularly so; on one side the wings were perfect, on the other they had not expanded one iota, they did not even look as large as they should have been when it burst.

I saw *Lunas* flying for n my life. They mount easily and make good progress, on is performed wholly by the front wings; the tails were crosse one instance I felt certain the curves were linked into each oth firmness and immobility to the hind wings. I took a pair of *eminata* in coitu; the singular form of the object arrested my atte without suspecting it was produced by insects. The sexes differ gr ly, in both size and markings. It has been an extremely rare insect in n. experience, having never seen the male before, so I was much pleased with my find.

I took my first specimen of *Datana angusii*, and a single specimen of a *Datana* of the *ministra* type, but with only three lines across the wings, wavy and comparatively even.

I also made my first capture of *Halisidota maculata*, although *Caryæ* and *Tessellata* are amongst the most constant and plentiful species in the Hamilton neighborhood. On the field day of our Society during its annual meeting in August last, I took a *Tussock* larva on bass wood that attracted my attention by its bright lemon yellow colour, and square black spots down the centre of its back. Not knowing it I showed it to Mr. Fletcher, and he pronounced it to be *H. maculata*. During September they were quite abundant on the maple shade trees about London.

During that June visit I took an *Azelina hubnerata*, which has been in my experience a very rare and variable geometer. I am aware that some of the forms that I have taken may have distinguishing names, but I have not had them authoritatively determined. I also took five specimens of *Dryocampa rubicunda*, my first captures of that attractive moth, several *Tortrixes* and other small moths new to me, which have not yet been identified, and a variety of good but not uncommon moths besides; also two males and six females of that delicate long-sting Hymenopter *Arotes amœnus*, Cress., making altogether a very satisfactory two weeks' collecting.

I made another visit between the 18th of July and the 2nd of August, to a locality 25 miles north of the city, but got nothing worthy of notice, except, perhaps, a *Catocala relicta*, for its being somewhat early in the season. In London during November *Operophtera boreata* was very plentiful, yet I did not see a single specimen of an *Anisopteryx*.

J. ALSTON MOFFAT.

VANESSA CALIFORNICA IN VANCOUVER ISLAND.

Noticing the remarks of Mr. W. G. Wright in the February number of the CANADIAN ENTOMOLOGIST respecting *V. Californica*, I considered it would be of interest to give particulars of its capture at Victoria, B. C. During 1890 it was scarce in this vicinity, though probably common enough on higher elevations. The specimens taken by me were captured at Beacon Hill, amongst or near the fir trees that compose the wooded part of the Park, and situate some sixty feet above the sea level. I secured my first as it was rapidly flying along a new made road, which runs through the firs; this was on September 9th. The next time I saw it was September 21st, when I managed after a long run to net a worn-out specimen. A whole month intervened before seeing it again, the third one being captured October 26th. This was the last, and was taken off a fir tree whilst sucking the sap, apparently too satiated with the juice to heed danger, being easily taken, and transferred to my collecting box. It was a good specimen as regards plumage, but ragged and torn, having evidently been "on the road" a long time. Mr. James Fletcher, of Ottawa, kindly named it for me, at same time mentioning that it was the first recorded capture from Vancouver Island, if not in Canada.

I doubt very much if those taken by me were bred here, but hold more to the idea that they were visitors from foreign parts across the Sound, or perhaps from the northern part of the island. Mr. W. G. Wright says:—"It is of no value itself; it is usually present when you don't want it, and its appearance seems to be the signal for more interesting species to disappear." This without doubt is true as regards California, its natural home; but considering all things, I certainly believe that its appearance on Vancouver Island *is* of value, even if it does nothing more than add another species to the list of diurnals occurring here, and I fondly hope to see it again this year.

W. H. DANBY.

Victoria, B. C., Feb. 21st, 1891.

CANADIAN RHYNCOPHORA.

Since writing the notes on Rhyncophora which appeared in the February issue, I have had an opportunity of obtaining Dr. Sharp's determination of the two species mentioned on pages 22 and 23. He writes to me as follows:—"The two weevils from Cape Breton are: 1. *Otiorhynchus rugifrons*, Gyll., 2. *Sciaphilus muricatus*, both common N. European insects. The [illegible] slight var.; the *Sciaphilus* not distinguishable from Scc [illegible]

W. H. HARRINGTON.

ARCTIA ARIZONENSIS, STRETCH.

I obtained eggs from a worn ♀ tak n at light near Salt Lake City, Utah, in June; these gave me a fine lot of imagines early in September, and I again got eggs from them, and had larvæ feeding which produced a number of moths at various times du ing the winter. Some of the larvæ ceased to feed when one-third grown, and I dumped them out among weeds by my orchard fence to take their chances. From the two broods I got about 150 fine examples of the perfect insect. Part of the first lot were fed up by a friend in Ogden, Utah, and sent to me as pupæ, part were fed in Denver City, and many I reared in the mountains above Platte Canon (10,000 feet elevation). The last brood were reared in Western New York. The larvæ were very easy to manage and ate freely of almost anything. Plum, willow, plantain, polygonum, lettuce and chickweed were given them as best and easiest obtainable, but nothing seemed to come amiss. Under the different conditions of altitude, climate and food I ought to have obtained varieties, if the species varies at all, but I never bred any *Arctians* that kept so constant to the parent form. I also have about a dozen of both sexes taken at light in Utah and Central Colorado, and these also are the counterparts of my bred examples. All the males are precisely like Stretch's figure of *Arizonensis* ♂, the ♀ ♀ exactly like his *Autholea* ♀, in the same work (Zyg. and Bomb.), but not one male was like his *Autholea* ♂ as there figured, but all well spotted on underwings like his figure of *Arizonensis* ♂. I give description of the mature larva (the earlier stages were plain black):—Head and thoracic feet shining black with tinges of chestnut; body velvety black with narrow reddish brown dorsal line (produced by two linear spots on each segment). all tubercles intensely black, those above lateral fold all crowned with bunches of short black hairs; those on second and

third segments have many light brown hairs intermixed; the bunches below lateral fold are light brown, thus giving the larva the appearance of being fringed; body beneath and abdominal legs light purplish brown. Length, two inches. Pupa black, covered with white powdery bloom. The eggs were very numerous and small and light yellow in colour. The hairs of the larva possess stinging properties, and are very irritating to the bare arms and face, as I experienced to my great annoyance on several occasions. DAVID BRUCE, Brockport, N. Y.

PLATYNUS NEW TO CANADA.

Among the commoner beetles at Sydney, Cape Breton, if not indeed the most abundant, is a species which has, I think, not been recorded in Canadian lists. I refer to *Platynus hardyi* which was described by Leconte (Bull. Brooklyn Ent. Soc. Vol. II., p. 53) from Newfoundland specimens received by him from Baron de Chaudoir. I cannot find any record of it from other localities. The specimens which I collected in 1884 were not carefully examined and were placed with *P. cupripennis*, of which a few examples were collected at the same time. On looking over the lot last winter I found that they were undoubtedly *P. hardyi*, and last September I captured a nice series. The species is eminently gregarious, and when a good locality is found they may be seen in numbers under boards or loose stones, but the colonies scatter so rapidly that the majority escape. Whether this beetle is distributed through, and indigenous to the island, or has been brought over from Newfoundland in one of the numerous steamers that carry coal from Sydney and return in ballast, I cannot say. W. H. HARRINGTON.

BOOK NOTICE.

MANUAL OF ANIMALS INJURIOUS AND BENEFICIAL TO AGRICULTURE.

Dr. J. Ritzema Bos, lecturer at the Agricultural College of Wageningen, Holland, has just published a magnificent volume in German which makes one wish English-speaking farmers and gardeners, as well as entomologists, possessed in their own language, and for their respective countries, a similar compendium of knowledge on the "Animals injurious and beneficial to agriculture, cattle breeding, forestry and horticulture." (*Tierische Shadlinge und Nützlinge*, Berlin, 1891.)

This work of 876 pages contains all the information necessary concerning the forms, occurrences, life history in relation with man of his various animal friends and foes, and the curative and preventative measures against their attacks. The newest discoveries of workers in this field, and original researches by the author are recorded, and 477 figures, engraved with scientific accuracy show the appearance of the different mammals, birds, insects, , the details of their structure, and many devices for re s kinds or assisting those that war against the latter and an ious allies of the farmer and gardener.

The first 30 pages are t onsiderations on the causes of occurrence of obnoxious anir he general means of protection against them. Then 80 1 mammals from the bear to the mouse and the bat, 120 of sects, 130 of snails and worms. The depredations of insects, w een particularly studied by Dr. Bos, are especially dwelt upon.

At the end of the book are tables of the animal pests arranged according to the place where they live. This table is most useful, for, with its aid, anyone who has found any form of animal life preying on man, cattle, domestic animal, tree, or plant, or in granary, barn, or house, and wishes to know its name, habits, the nature of its ravages, the remedies against it, etc., can with very little trouble find the page in the volume where the desired information is given.

For instance, the first item of this table is as follows, with reference for each animal to the page in the book :—

BEE, BEE HIVE :—Foxes, marten, polecat, bear, honey-buzzard, tits, occasionally other bird species;—spiders ;—wasps ;—the brown bee louse (*Braula cœca*, a winged louse) ;—the so-called black bee louse (larva of an oil beetle), which, however, leads usually its cuckoo life only in wild bees' nests ;—bee moths, wax moths ; bee-beetles ;—earwigs.

Similar lists follow for cat, cattle, dog, domestic birds and eggs, goat, horse, man, pig, rabbit, sheep.

The references to apple tree pests are arranged under the different heads : In roots, in wood, under bark, in bark crevices, on and in buds, on young shoots, on one year's twigs, on buds and leaves, in the fruit, ravagers of the fruit ; and similarly for all common trees and plants of field, garden, or forest. J. A. GUIGNARD, Ottawa.

Mailed May 5th.

The Canadian Entomologist.

VOL. XXIII. LONDON, JUNE, 1891. No. 6.

NOTES ON SOME SPECIES OF NOCTUIDÆ DESCRIBED BY FRANCIS WALKER.

BY PROF. JOHN B. SMITH, NEW BRUNSWICK, N. J.

In Vol. XXXII. and XXXIII. of the list of Lepidoptera Heterocera in the British Museum, Mr. Walker described some species from "West Canada, in the Rev. Mr. Bethune's collection." No records of specimens in the Museum are given, and the descriptions are of specimens apparently returned to the collector. On the chance of these specimens being still in existence I wrote Dr. Bethune, begging him for such assistance and information as was in his power to afford. He very kindly responded, saying, "I shall send you by mail to-morrow a box containing the few specimens that I have left that were named for me by the late F. Walker. The labels on them are mostly in his own hand-writing. When I came here in 1870 I had no room for my cabinet and was obliged to store it away in a dark place for some years. I was also so very hard worked, building up this school, etc., that I was unable even to look at my specimens. Consequently the *Dermestes* got in and destroyed a large number —especially those set low down—that were my first captures, and that Walker had named. Thus many of his types had perished. I do not think it matters very much, as the descriptions and identifications were often so unsatisfactory. After seeing what I send you, you might *abolish* all the others that are stated to be in my collection, because they are no longer in existence and cannot be identified."

The box came duly to hand, and as the specimens gave rise to some doubt, and I desired to fully establish the value of the labels, I again wrote Dr. Bethune, and he replied:

"I have been unable to find any more records regarding my 'Walker insects.' The *printed* labels and numbers on those I sent you were put on by myself—the *written* ones are Walker's. It is of course quite possible that some of them got transposed, as they have been changed from one cabinet to another, and had also to go through a severe disinfecting

process to get rid of the *Dermestes*. This has no doubt happened in the case of the specimen marked *Agrotis ordinata* that you refer to.

"Where the specimen agrees with Walker's printed description, it is either a type or corresponds closely to his type—perhaps examined at, or nearly at the same time. * * * My first acquaintance with Walker was in 1863 when I spent some time in London. I was in England during the greater part of '63 and '64 [illegible]ntly to go to the Brit. Museum, and struck up a great frie[illegible] which continued to his death. We corresponded regularly, a[illegible]: his publications and quantities of European and other insects, for which I made the best return I could. He was one of the quietest and gentlest of men; his sensitive nature was much pained by some of the harsh and rough criticisms that were passed upon his work. His mistake was in attempting too much. Had he confined himself to the Diptera, his reputation would probably never have been impaired."

At my request Dr. Bethune kindly gave me permission to deposit these specimens in the U. S. National Museum at Washington when I had examined them, and there they now are, accessible to all students who may desire to verify my conclusions.

Nine species only are described by Walker as "In Rev. Mr. Bethune's collection," but a number of others are given as from West Canada, and sometimes they are said to come from Mr. Bethune.

Of these nine species eight are represented in the specimens before me, one only, *Agrotis vetusta*, is wanting. With the exception of the specimen labelled "*Agrotis ordinata*," all are evidently the types, agreeing in sex and in all other points with the description. In ***Agrotis ordinata*** I cannot accept the labelled specimen as type, though it agrees in at least one important feature—the sex.

The few specimens which are not types, are in many instances erroneously named—provided that the species we know under Walker's names are really his species.

In detail the specimens before me are as follows:—

Mamestra insulsa, Walk., C. B. M., Lep. Het. IX., 234, 1856.

An imperfect specimen; but not the type. It is ***Hadena ducta***, Grt., (Bull. U. S. Geol. Surv., IV., 176, 1878). The type is in the British Museum and has been examined by Mr. Grote who said first it was an *Hadena*, and afterwards that it was an *Agrotis* allied to ***repentis*** (*Carneades messoria*). Walker's description applies perfectly to the specimen

before me, and does not apply well to any form of *messoria* known to me. As the type is in existence, the best way will be to cite *insulsa*, Wlk., as a questionable synonym of *ducta*, Grt., and thus call the attention of whoever may have a chance to make the comparisons to the probabilities. The species was described from Orillia, West Canada, and the locality is therefore in favor of the name.

Mamestra displiciens, Wlk., C. B. M., Lep. Het., XXXII., 660, 1865.

The specimen is labelled by Walker, and is evidently the type. It is a normally marked *Carneades messoria.*

Mamestra unicolor, Wlk., C. B. M., Lep.-Het., IX., 233, 1856.

Determined by Walker, but not the type. It is *Noctua clandestina*, Harris, and therefore agrees with the type, which Messrs. Grote and Robinson have also identified with *clandestina.*

Mamestra nigriceps, Wlk., C. B. M., Lep. Het.. XXXII., 659, 1865.

Apparently the type, agreeing well with the description, but without Walker's written label. A printed label has been substituted for the original, if a written one ever existed.

This species is also equal to *Noctua clandestina*, Harr. It was described as in Dr. Bethune's collection.

Mamestra contenta, Wlk., C. B. M., Lep. Het., IX., 232, 1856.

A badly rubbed specimen, but easily recognizable as *Hadena devastatrix*, Brace, and therefore like the type which Mr. Grote has referred in the same way.

Agrotis reticens, Wlk., C. B. M., Lep. Het., XXXII, 692, 1865.

Two specimens, one with Walker's written label, the other with a printed "Type" label and a printed specific label. Both specimens are *Carneades messoria*, Harris.

Agrotis ordinata, Wlk., C. B. M., Lep. Het., XXXII., 691, 1865.

The specimen bears Walker's written label, and is described as in Dr. Bethune's collection; but it does not at all agree with the description. Neither does it agree with the description of any other of the species described from Dr. Bethune's collection. The specimen is *Pyrophila tragopogonis*, Linn., and I can only imagine that Walker in placing his labels, placed this one on the wrong specimen, or that in the transferring in Dr. Bethune's collection, another specimen became substituted for the type. What is described is really a form of *Carneades messoria*, Harr., to which I would cite *ordinata* as a synonym.

Agrotis vetusta, Wlk., C. B. M., Lep. Het. XXXII., 691, 1865.

This species is not represented in the material sent, and I am entirely unable to apply the description to any form known to me, either in the *agrotids* or in the *noctuids* as a whole. According to Dr. Bethune's statements the type, mentioned by Walker as in his collection, has no present existence, and as the description cannot be satisfactorily applied, the name must drop. I have repu tion in my Revision of the *Agrotids*, p. 212.

Walker has described under th name *vetusta* an *Agrotis*, a *Mamestra* and a *Mythimna*. It w *imna vetusta* which Mr. Grote suggested might be his *murænul* not t *Agrotis* as I erroneously suggested in my transcript, nor the *Mamestra* as Mr. Grote stated in the last number of the CAN. ENT.

Agrotis inextricata, Wlk.

A specimen of *Carneades messoria*, Harris, is so labelled in Walker's handwriting, but I cannot find any description of the species under that genus. Walker does, however, describe a *Mamestra inextricata* (C. B. M., Lep. Het., XXXII., 658, 1865), and as the description applies well enough and the specimen is said to be in Dr. Bethune's collection, it may be accepted as type, and cited as a synonym to ***Carneades messoria.***

Agrotis indirecta, Wlk., C. B. M., Lep. Het., XXXII., 659, 1865.

In this case also the species is described under ***Mamestra***, and the species applies well to the specimen labelled *Agrotis indirecta* in Walker's handwriting. The specimen is ***Carneades messoria***, making the fifth name applied to this species in Dr. Bethune's material alone!

How many more of Walker's names can be applied to this species when the types are studied, it is interesting to contemplate? Thus far no redescriptions of *Carneades tessellata* have been identified; but it seems scarcely possible that the species should not have been represented in material received by the British Museum, and its variations must have afforded full scope to Walker's peculiar genius.

Hadena tenebrifera, Wlk., C. B. M., Lep. Het., XXXIII., 714, 1865.

A male specimen in very fair condition is ***Semiophora catherina***, Grt., (CAN. ENT., VI., 116, 1874, *Matuta).* The specimen bears Walker's label, agrees with the description, and is unquestionably the type. The species must be known in future as ***Semiophora tenebrifera***, Wlk., and ***Catherina***, Grt., cited as a synonym.

Apamea velata, Wlk., C. B. M., Lep. Het., XXXII., 671, 1865.

The type is in unusually good condition, bears Walker's label, and is *Apamea sera*, G. & R., (Tr. A. E. S., I., 345, pl. 7., f. 5). The species must be known in future as *Apamea velata*, Wlk., and *sera* cited as a synonym.

Apamea rubrescens, Wlk., C. B. M., Lep. Het., XXXII., 671, 1865.

The type, bearing Walker's label, is in very good condition, and is the species recently described by myself as *Tæniocampa venata*, (Ent. Amer., VI., 123, 1890). The species will be known in future as *Tæniocampa rubrescens*, to which *venata*, Smith, must be cited as a synonym. I should be delighted to refer all the species described by me as synonyms, could I thereby identify an equal number of the Walker species.

Apamea, n. sp.

A specimen bearing this label, in Mr. Walker's handwriting, is *Parastichtis perbellis*, Grt.

Caradrina multifera, Wlk.

A specimen named by Walker, but bearing a label in Dr. Bethune's handwriting, is also *Parastichtis perbellis*, Grt. The specimen is not the type, and is an evident misidentification.

Xylina signata, Wlk.

The specimen bearing the label in Mr. Walker's handwriting is *Dasylophia interna*, Pack., and is not the type.

Heliothis binotata, Wlk.

A specimen of *Plusia aereoides*, Grt., is so labelled, but I cannot find any description of the species.

Heliothis temperata, Wlk.

This label, in Mr. Walker's handwriting, is attached to a specimen of *Plusia aerea*, Hbn.; but as in the case of the preceding, I cannot find that the name has been sanctioned by a description.

Bryophila, sp.

A specimen of *Acronycta hamamelis*, Gn., is so labelled by Mr. Walker.

Altogether this little lot of insects, while disposing of a few unidentified names, illustrates well the character of Mr. Walker's work. None of these names could have been with any degree of certainty applied from the descriptions to the species really intended, and the generic references are as often misleading as an assistance.

NEW RHOPALOCERA AND HETEROCERA.

BY B. NEUMOEGEN, NEW YORK.

Catopsilia neleis, var. floridensis ♂ ♀.

A beautiful variety of *C. neleis*, Boisd. It differs from its tropical types considerably.

The ♂ ♂ have a bri[illegible] in basal half of primaries, the broad anterior space bei[illegible]hite instead of the citron colour in the typical form.

The same is the case with the secondaries, except that three-quarters of the area of wings are of bright sulphur.

♀ ♀ are not yellow, but creamy-white with large black discal spots, black rimmed apices and anterior margins of primaries, and with prominent citron tinge of the basal area of secondaries.

C. neleis has so far been unknown to our fauna.

The collector whom Mr. Chas. Palm and I sent to the Upper Indian River of Florida succeeded in capturing about fifteen specimens of this form.

Catopsilia agarithe, var. Maxima.

The ♂ ♂ intense orange colour with prominent black dotlets at interception of nervures and exterior margins, both on primaries and secondaries.

The ♀ ♀ of equally intense colouring. The discal spot, the diagonal line of dots from apex to submedian nervure and along exterior margin of primaries being brownish red. On secondaries the markings along exterior margin are dark red with blackish tint, much resembling those of *C. philea.*

Expanse of wings, 66 mm.; length of body, 26 mm.

The examples caught (about 50) have been found uniform in size and markings. This is a giant form of its kind and remarkably handsome.

Habitat: Upper Indian River, Fla. Types coll. Neumoegen and Palm.

Oeta compta, var. floridana.

Much larger than the typical form. Head, thorax, and primaries of dark reddish-orange. The interspaces between transverse lines of primaries larger than in the type form.

Secondaries: Costa, apex, exterior margin, and nervures black, basal half grayish, hyaline. Abdomen steel blue.

Expanse of wings, 25 mm.; length of body, 11 mm.

Habitat: Upper Indian River, Fla. Types coll. Neumoegen and Palm.

About fifty specimens were caught, all uniform in appearance.

Antarctia Beanii, n. spec.

♂. Thorax and abdomen above and below very hairy, concolorous with primaries, the abdomen somewhat paler, especially at the sides.

Head, breast and antennæ bright reddish-brown, the latter prominently pectinated. A blackish tint on patagiæ, and a faint black dorsal line on abdomen. Legs bright reddish-brown, the femora especially so.

Primaries reddish brown, of lighter tinge at base and basal part of costa. The following maculations in brownish-black. Two large irregular median bands starting from costa, one between base and center, and the other above discal cell respectively, running across the entire wing and converging at center of interior margin, thus forming a triangle, resembling the Roman letter V. A broad band along exterior margin. Fringes blackish. In some specimens the marginal band being broken up in irregular blotches. These various bands are so conspicuously placed as to show the inner spaces, enclosed by them, more prominently, the latter looking like a triangle resting with its base on costa and like a mesial line outwardly curved. Secondaries rose colour. Fringes blackish. Two mesian bands of gray-black, irregularly formed. The anterior band more pronounced, the interior one being more of a curved line of irregular, large dots.

Below, both primaries and secondaries reddish brown, merging into rose colour along anal margin of secondaries and costa of primaries. All maculations grayish-black, faintly indicating marginal and anterior mesian bands on primaries, and showing the mesian bands of secondaries.

♀. Antennæ minutely pectinated, nearly simple, of bright rose brown colour with blackish tinge at base. All maculations brighter than in the ♂, especially the reddish and rose tints.

Expanse of wings: ♂, 33–35 mm.; ♀, 29–30 mm. Length of body: ♂, 10 mm.; ♀, 10 mm.

Habitat: Laggan, Alberta, N. W. T. Types coll. B. Neumoegen.

This is the most northern *Antarctia* so far found in our fauna.

I take great pleasure in dedicating this handsome species to Mr. Bean, to whose indefatigable explorations of the Alberta subalpine fauna I owe my specimens.

Antarctia Beanii, v. fuscosa.

A beautiful variation in which the primaries in ♂ and ♀ are nearly uniformly brownish-black from base to exterior margin. The triangular spot at costa as well as the mesian line being slightly indicated.

Types coll. B. Neumoegen.

It seems to me that *Arctia Brucei*, Hy. Edw. (Entom. Amer., Vol. III., p. 183), is not a tr[illegible] closely related to *A. Beanii*. Excepting the slight dim[illegible]ure in the ♀ ♀, these insects show conclusively how r[illegible] *Antarctia*, Hb., comes to Lederer's genus *Ocnogyna*.

All the specimens of *A. Beanii*, in[illegible]ng its var. *fuscosa*, having been raised by Mr. Thos. E. Bean, I asked [illegible] for some data about the larvæ and their life habits, to which he kin[illegible]acceded. I publish them herewith in his own words :

"All specimens are bred from larvæ taken (when in or near final stage) near Laggan. Only one imago has been found in the four seasons I have collected here. One ♂ bred in 1886 from an estray larva was the first seen. In 1888 the imago above mentioned was found. (July 2, a ♂.) In 1889, 2 ♂ ♂, 1 ♀ were bred from estray caterpillars. So up to 1890 only six were seen, though I often searched for them. But in June, 1890, I found them more frequent in one limited tract of about two acres—elsewhere none to be found. Larva feeds on willow exclusively, I think. At any rate all I have found feeding were on willow. The imagines bred in 1890 came from pupa chiefly between July 4th and 21st, though one ♂ delayed until Aug. 4; 1890 was a late season. Those bred in 1889 emerged June 8 and 24 (2 ♂ ♂), June 26 (1 ♀). Males and females equally numerous. The ♂ ♂ are noticeably larger than the ♀ ♀, as an average. As to extremes of size, the ♀ ♀ vary most; there are more extra small ♀ ♀ than ♂ ♂. The ♂ ♂ average decidedly darker than ♀ ♀. Occasional ♀ ♀ are extremely dark. This species occurs at an elevation ranging from 4,800–5,000 feet, so far as observed. The mature larva is about 24 mm. long. Ventral and basal lateral region clothed with rust-red hairs. Dorsal and upper lateral region usually has jet black hair, but sometimes some of the hairs are whitish. Hair of median lateral region sometimes black, sometimes whitish."

Heterocampa nivea, n. sp.

Antennæ slightly pectinated, white above, black below. Head, thorax, abdomen, legs, and both wings white. Thorax and abdomen heavily

tufted. A little dusting of black across basal half of primaries. A few black grains on costa, between discal space and apex, and a few black tiny dots at intersection of nervures and exterior margin of primaries.

Below, uniformly white.

Expanse of wings, 46 mm.; length of body, 14 mm.

Habitat: Virgin River, S. Utah. ♀. Type coll. Chas. Palm.

Gonodonta unica, n. sp.

Palpi, head and collar brilliantly white. Eyes black. Antennæ brown. Thorax heavily tufted, dark brown. Patagiæ powdered with gray. Abdomen and legs bright yellow. Fringes grayish brown. Interior margin inwardly curved near the outer angle and overlapping near base. Primaries, for three-quarters of their extent from base, dark brown with an olive tint, bordered by a dark transverse, undulating line, and showing in this field traces of such lines. Discal spot indicated by olive colour. Base, inner curve of interior margin, and a basal dash of lilac grainlets. The space from costa near apex down to the sharply pointed outer angle transversed by well defined undulating lines of lighter colour. Secondaries of uniform bright yellow. Fringes concolorous. A black irregular marginal band to anal angle.

Below: Primaries brownish-black fading into light yellow along exterior margin. A bright yellow basal tuft, and the costa of the same bright colour. Nervures indicated by yellow lines. Secondaries uniformally yellow.

Expanse of wings, 33 mm.; length of body, 12 mm.

Habitat: Indian River, Fla. Types, ♂ ♂. Coll. Neumoegen and Palm.

This insect is easily distinguished from its West Indian and South American relatives by its size and yellow secondaries.

Heliodora, n. gen.

Eyes prominent, naked. Infra-clypeal plate projecting. Vestiture hairy. Palpi short and fringed. Abdomen stout, untufted. Primaries long and narrow, rounded at apices, curving somewhat at exterior angle, and bulging near base. Secondaries much broader than primaries, rounded. Tibiæ spinose, armed with two outer claws.

Heliodora magnifica, n. sp.

Eyes black. Antennæ brown, slender. Head, collar, thorax, and upper part of abdomen straw-yellow. Fringes brown. Legs yellowish-

white. Primaries consisting of two distinct, uniform colours. The lower and larger area, starting upward from bulge near base in an outwardly curved line, and rounding off sharply at apex, is a field of chestnut-brown. The rest, from below base rounding upward, running parallel with costa to apex and including half of discal cell, is a costal field of bright yellow. Secondaries light yellow, fading into white along anal margin and near basal are … r marginal line. Fringes light yellow.

Below: Abdomen yello… …imaries and secondaries yellowish-white with a decided metallic … A narrow strip of bright yellow along costa of primaries, and in … centre of same a broad brown dash triangularly formed and pointing tow… ds base. Fringes prominently brown.

Expanse of wings, 22 mm.; length of body, 5 mm.

Habitat: Houston, Texas. Type, ♀. Coll. B. Neumoegen.

This beautiful *Heliothid* is unlike any other of our fauna, both in shape of wings and odd markings. It comes, apparently, near the genus *Schinia*, Hb.

A NEW BUTTERFLY FROM LOWER CALIFORNIA.

BY A. G. WEEKS, JR., BOSTON, MASS.

Pyrgus pelagica, n. sp.

Habitat: San José del Cabo, Lower California.

Expanse, 1.25 inches.

Description.—Under side of palpi and head covered with whitish hairs; top of same blackish-brown gray; forehead with some whitish hairs mixed with the darker. Thorax and abdomen blackish above, end of abdomen shading into gray, beneath whitish. Legs covered with whitish hairs, brownish at ends. Antennæ blackish, with small white annulations at base of each joint; club above blackish, tipped with light brown, below light brown down to joint. Wings above dark-brownish gray, with white and grayish-white spots, hind margins with a fringe of dark brownish-gray. Hind margin of forewings edged with a dark line, just within which, in interspaces, is a row of indistinct darkish spots, absent in some specimens. The dark brownish-gray covers marginal

area, and is dusted and irregulary shaded with grayish scales. On costa one-fourth distance from tip to base, between the subcostal nervules, three (sometimes two or one) small white spots. Across centre of wing, extending from edge of costa across end of discoidal cell down to submedian nervule, a whitish band of consecutive spots, of irregular form and varying distinctness, sprinkled more or less with brownish scales. In some specimens this space shades off into ground colour, in others the edges between spots and ground colour are distinctly marked, and bordered with a darkish line. In centre of cell, an irregular whitish spot of same character; between this spot and the spot at end of cell, and below submedian nervule, an irregular whitish spot, dusted more with brownish scales. Base dark brownish-gray, with some grayish scales. The suffusion of the ground colour is more marked in some specimens than others, rendering an accurate general limitation of the spots difficult. Some specimens show a slight yellowish tinge on white spots. Ground colour of hindwings a blackish-brown, of more distinct character than the ground colour of forewings. Costa white. Hind margin edged with a dark line, within which, in interspaces, is a row of white specks, sometimes absent, which, at anal angle, are transversely elongated, forming an indistinct line from inner margin to submedian nervule. Within these, one-third distance to base, a row of brownish spots, extending from costa to inner margin, parallel to hind margin, but not in line, and the one near centre larger than the others, and drawn nearer to cell. Within these, across centre of wing, a prominent whitish band, forming an extension of the same on forewing, but of purer white, ending at submedian nervure. Basal area of ground colour, but toward inner margin, covered with light grayish hairs, which extend along margin to anal angle. Beneath general colour is grayish-white, with a very slight yellowish-brown tinge, and showing shadows of the markings above. Costa of forewing marked with darkish-brown and white, reflecting markings above. Hind margin edged with blackish-brown, and within, covering one-third of marginal area, darkish-brown, with a row of white specks in interspaces. Costa of hindwing white, same as ground colour. Hind margin edged with a line of blackish-brown, shading off into ground colour. In space below submedian nervule, the dark markings of upper side show more prominently than elsewhere.

Described from twelve specimens in my collection, taken near San José del Cabo, in Lower California, by Mr. M. Abbot Frasar, 1888.

MELANISM AND HUMIDITY.

BY J. W. TUTT, F. E. S., WESTCOMBE HILL, LONDON, ENGLAND.*

At different times considerable attention has been paid to the general darkening in colour of our British insects, compared with Central European and with An Britain, many species become much darker (some abso rious parts of the West Coasts of Ireland and Great Bri general rule, the more humid districts produce the darke e. g., *Acronycta (Viminia) euphorbiæ* var. *myricæ*, *Xylophasia* lon vars. *infuscata* and *nigra*, *Viminia rumicis* var. *salicis*, etc. find, moreover, that certain geological strata are more prone to prod ce dark varieties than others, *e. g. Gnophos obscurata* on peat, etc. he mes quite black; and in manufacturing districts, where the surfa fences, trees, etc., get much darker than is normally the case, hich rest on them also become darker, to wit., *Amphidasys betularia* var. *doubledayaria*, *Hybernia marginaria (progemmaria)* var. *fuscata*, *Eupithecia rectangulata* var. *nigrosericeata* and *Boarmia repandata* var. *nigra*, (a magnificent form from Huddersfield, in which the whole area of the wings is intensely black). In excessively moist districts, those insects which rest on the ground, trees, rocks, etc., are those which are chiefly affected, because here, the ground, trees, rocks, etc., becoming permanently darkened by rain (*vide* "Entomologist's Record," Vol. I., pp. 123, 124), the darker specimens are thus preserved by "natural selection." Where the geological stratum is naturally dark in colour, "natural selection" acts much in the same way. In manufacturing districts the atmosphere is polluted with carbon particles, and when the rain falls the impurities are brought down with it, but when the water evaporates the solid matters are left behind, and thus surfaces of trees, etc., are artificially darkened. There is no doubt that the great agent in effecting the darkening of insects, which rest in such places, is "natural selection," aided, of course, by the tendency that the surfaces of certain objects have to become darker when continuously wet or damp. The intimate connection between humidity and melanism is well illustrated by the fact that at high altitudes (where the humidity becomes greater) melanism again shows itself, as in

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the case of *Viminia euphorbiæ* var. *montivaga*, an Alpine form, closely resembling our var. *myricæ*. In Dr. Staudinger's trade lists, too, most of the Alpine forms are spoken of as vars. *obscura*, *suffusa*, *unicolor*, etc.

Our northern latitudes give us, generally, forms more than usually pallid, and which rarely present any tendency to variation in the direction of melanism. As, however, melanic tendencies were first noticed in connection with specimens from a high altitude, it became the usual thing to associate melanism with a low temperature, until the Western shores of the British Isles, with a comparatively high temperature, were found to produce some of our most intensely melanic forms, and it was then found that melanism was accompanied by humidity rather than by a low temperature.

To get reliable results from actual experiment is difficult, as a certain phase of melanism is frequently found to accompany degeneracy and change of constitution (*vide* "Entomologist's Record," Vol. I., pp. 236, 237, 272) brought about by inbreeding. Besides, great care must be taken in experiments, to see that species are chosen in which a natural hereditary tendency to vary does not exist. Mr. Merrifield's experiments, the results of which were read before the Entomological Society of London in December last (*vide* "Entomologist's Record," Vol. I., pp. 267, 268), appear to be open to these objections.

It seems to me that the exciting cause to variation must act in the active larval stage, and not in the comparatively quiescent pupal stage, and an experiment (?) of which I have lately heard, designed to test my theory of humidity, in which some pupæ of *Selenia illustraria* were practically kept in water for a week or two, whilst others were kept very dry, only serves to show how hardy the pupa is, and how difficult to kill. Experiments of this kind partake of the ridiculous and make science look foolish.

As my series of papers on this subject will take some time yet to finish, I should be very thankful if any American entomologists could give me information with regard to the matter, especially as to the general tendency of insects to become (1) more than usually pallid in dry, open areas at a high latitude, and (2) darker in humid districts at either high or low altitudes.

PREPARATORY STAGES OF ARCTIA RECTILINEA, FRENCH.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter, .03 inch; height, .03 inch; blunt conic; smooth. When first deposited white; after a few days yellow. Duration of this period, five days.

Young Larva.—Len ylindrical; head a little larger than body; six rows of long hairs. Colour of body and hairs white; head black; black spot on top of joint 2. Duration of this period, three days.

After First Moult.—Length, .12 i . Cylindrical; eight tubercles to each joint; pale reddish; the tubercl darker red than the body, from each a few hairs, those on the back black, lateral white; head black; two spots of the same on top of joint 2. Dur tion of this period, five days.

After Second Moult.—Length, .20 inch. Cylindrical; head a little smaller than body; pale dull brownish, perhaps a dark dull amber; a dorsal pale stripe in which is a whitish spot in the top of each joint; a paler subdorsal stripe, but lacking the white spots; dorsal tubercles black; the dorsal space a little darker than the sides; lateral tubercles concolorous or scarcely darker than the ground; spreading tufts of hair from the tubercles, the dorsal black, the lateral gray, all short; a few hairs, one to each tubercle, on posterior part of the body that are slightly longer than the others. Duration of this period, five days.

After Third Moult.—Length, .35 inch. Cylindrical; head a little smaller than the body; eight tubercles to each joint; the dorsal moderately elevated, the lower lateral less so, a gradation from one to the other; tuft of short spreading hairs of unequal length from each; the centre of tuft slightly longest; the central hairs on posterior part of the body a little longer than the others. Ground colour lilac-grey; a dorsal and subdorsal line of sordid white; dorsal tubercles black, with the black extending as a border along the upper side of subdorsal line; the two next tubercles dull pale orange, grey tipped; the fourth ground colour, with the tip darker; ground colour outside of tubercles, and lines spotted with black; head and thoracic feet black; hairs as before; prolegs smoky, light at tip. Duration of this period, three days.

After Fourth Moult.—Length, .50 inch. Marked very much as before but the ground colour darker; dark gray, in some small examples almost black; the dorsal tubercles shiny black, the lateral yellow-brown;

dorsal line very pale yellow, almost white; reddish tinted between the joints; subdorsal line duller; head black. Duration of this period, four days.

After Fifth Moult.—Length, .65 inch. Marked much as before but darker; ground colour lilac-grey, but so obscured by the black, enlarged dorsal tubercles and mottlings as to be almost black; lateral tubercles as before; dorsal stripe bright creamy-white; legs and head black; prolegs orange ochreous; lateral hairs grey, dorsal black.

Mature Larva.—Length, .95 inch. Cylindrical; ten tubercles to each joint; a small one close to the dorsal stripe, each with a tuft of spreading hairs that are studded with points like the forked point of a lightning rod, but shorter in proportion to the hairs. Colour mostly as at the beginning of the stage; the dorsal tubercles show orange on the top; the subdorsal line paler than the ground colour; abdomen and feet pale. Duration of this period, eleven days.

Chrysalis.—Length, .55 inch. Diameter through joint 1, .16 inch; through joint 3, .18 inch; length of wing cases, .28 inch, reaching almost to posterior part of joint 5; head rounded; two tubercles above the origin of the antennæ that are hairy, also two hairs each to two lesser tubercles between the origin of antennæ; terminal joint conical, scarcely any depression to cremaster; a terminal series of spreading hooks; smooth; thorax and wing cases very slightly corrugated; a slight raised ring to anterior part of each abdominal joint. Colour, brown-black. Duration of this period, from eleven to twenty-two days.

This species, like most of the *Arctians*, is a general feeder, but eats some things in preference to others. Among the several plants put into the breeding cage, clover seemed to be preferred, and they were fed upon that through most of their growth. As will be seen by the figures given, the time from the egg to the imago is from forty-eight to fifty-nine days. The eggs were deposited July 16, 1889, and the last moths came out September 12 the same year. There is with us an earlier brood of the moths coming out in May, making three broods in a season, though in the northern part of the United States, if it is found there, there are probably only two broods. The last brood of larvæ, like its allies, hibernates, and of course this lengthens the period from egg to imago over that of the two summer broods. Like other *Arctia* larvæ, these are very active when disturbed, running rapidly and hiding under the food in their cage. They also hide in this way when not feeding.

Among a large number bred, the males were nearly constant in their markings, varying slightly in the size of the spots near the outer margin of the hindwings and occasionally with the beginning of a transverse line inside the first one on the forewings, shown by a little bending in of the pale on the costal margin so as to sometimes touch the subcostal vein. Some of the females were of this type, but many of them varied from this by having less of the pa[illegible]orewings, even to the partial or total obliteration of the [illegible]ransverse lines. The tendency with such examples would be [illegible]ding and enlarging of the black spots on the terminal border of the hin[illegible]dwings, and a blending of these with the black of the edge, making a nearly solid terminal border. The red on the hindwings was constant, there being no appreciable difference in this respect between the sexes, as there is in *Nais*, nor in light or dark examples of either sex. The dark examples would have the black on the abdomen a little more prominent than on the light. The characteristic marks, straight transverse lines on forewings and veins pale, were constant whatever the other variations might be. In size, my specimens were small from being underfed, as a result of a great many larvæ crowded together in a single breeding cage. If they had been separated as much as they naturally would be in feeding in the open fields they would have been as large as caught specimens.

TWO NEW SPECIES OF CANADIAN PIMPLINÆ.

BY W. HAGUE HARRINGTON, OTTAWA.

Xorides caryæ, n. sp.

Female.—Length 11 to 16 mm. Black with yellowish-white markings. Head swollen, interior orbits, interrupted opposite antennæ, and palpi white; face below antennæ punctured, between antennæ and ocelli polished; antennæ slender, black. Thorax with the pectus and pleuræ finely punctate, polished; disc of mesothorax transversely rugulose; metathorax rounded, faintly sulcate medially and rugosely punctured and aciculated; sides of prothorax, two lines on mesothorax, two spots, sometimes confluent, on scutellum, the post-scutellum, the tegulæ and a broad stripe on pleura, continued on middle coxa, yellowish-white; legs, including coxæ, pale rufous or honey-yellow, anterior ones paler, the anterior coxæ, stripe on middle coxæ outwardly, second joint of trochanters and the knees yellow; tibiæ and tarsi piceous or blackish, the former with a

pale line within ; wings hyaline, nervures and stigma black. Abdomen with first segment rugosely sculptured, the segments becoming smoother toward apex of abdomen ; incisures of joints whitish, venter banded with white ; ovipositor 8 mm. in length, or hardly as long as abdomen.

Male.—Differs from female as follows : Face below antennæ and the scape beneath yellow ; anterior coxæ and most of prothorax below yellow ; abdomen long, slender and polished, with the tip of segments narrowly white. Length 16 mm.

Described from 4 ♀ and 2 ♂ taken in June and July on felled bitter-hickory *(Carya amara)*. The females were ovipositing, and probably are parasites of *Saperda discoidea* or *Dorchaschema nigrum.*

The American species, all of which occur in Canada, may be tabulated as follows :—

Abdomen entirely black..... ..*X. occidentalis*, Cress.
Abdomen with white markings ;
Ovipositor long..... .....*X. vittifrons*, Cress.
Ovipositor short,
Pleura black.....*X. borealis*, Cress.
Pleura, with white band.....*X. caryæ*, n. sp.

Xorides canadensis, Prov. (Nat. Can., VII., 248), =*Xylonomus albopictus*, Cress.

Xorides vittifrons, Cress., has been found in about the same numbers, as *X. caryæ*, but upon old maples infested with *Dicerca divaricata*, *Xiphydria albicornis*, *Tremex columba*, etc.

Xorides borealis, Cress., was described from Hudson Bay region ; a ♀ which I refer to this species differs from the original description in having the posterior femora rufous instead of black.

Xorides occidentalis, Cress., is found in Vancouver Island.

Xylonomus canadensis, n. sp.

Female.—Black ; length 22 to 26 mm ; expanse of wings 30 to 33 mm. Head large, face and vertex rugulose, cheeks aciculated, clypeus small with sutures obscurely rufous ; antennæ with annulus on joints 10–14. Thorax subopaque above and strongly punctured, pleura and pectus coarsely punctured but shining ; mesothorax flattened or slightly depressed medially, aciculated and with slight median carina ; scutellum punctured, shining ; metathorax with two discal carinæ enclosing a narrow oval area, lateral carinæ indistinct except at base near spiracles ; rugosely punctate and with small posterior tubercles ; legs black, knees white, four anterior

tarsi white with terminal joint black, posterior tarsi with terminal joint black, base of first white, remainder piceous; wings faintly clouded, stigma, except white spot at base, and nervures black. Abdomen opaque, with first segment suddenly widened and sides subparallel beyond spiracles, basal segments rugulose, with margins polished, becoming smoother toward apex; ovipositor as long as body, rufous, sheaths black.

Male.—Length 17 to [illegible] of wings 24 mm. Differs from female in having antennæ ei[illegible] more slender, and the anterior tibiæ have a white line externally.

Described from 4 ♀ and 2 ♂ captu[illegible] at intervals since 1878 on fences, bridges, etc.

This species looks very much like *X. s[illegible]mapterus*, Say (and a specimen was so determined for me by Provancher), but is abundantly distinct by its stouter abdomen and differently coloured tarsi, and its more robust and opaque appearance.

The American species may be tabulated as follows:—

Prothorax above with lateral tubercles;
- Wings with a fuscous band..... *X. australis*, Cress.
- Wings hyaline, legs black..... *X. Rileyi*, Ashm.
- Wings hyaline, legs partly red..... ***X. humeralis*, Say.**

Prothorax above without tubercles;
- Abdomen with lateral white spots..... ***X. albopictus*, Cress.**
- Abdomen with tips of segments white..... ***X. insularis*, Cress.**
- Abdomen entirely black,
  - Legs entirely black..... ***X. cincticornis*, Cress.**
  - Legs black and white.
    - First segment of abdomen slender...***X. stigmapterus*, Say.**
    - First segment of abdomen stout....***X. canadensis*, n. sp.**
  - Legs ferrugineous..... ***X. frigidus*, Cress.**
- Abdomen rufous,
  - Pleura red..... ***X. pulcher*, Ashm.**
  - Pleura black..... ***X. calidus*, Prov.**
  - Uniformly ferrugineous..... ***X. californicus*, Cress.**
  - Obscure rufous, legs black..... ***X. floridanus*, Ashm.**

The following are the species recorded from Canada: ***albopictus*** (Ont. and Que.), *calidus* (Ottawa), *frigidus* (Hud. Bay), ***humeralis*** (Ont. and Que.), *insularis* (V. I.), *stigmapterus* (Ont. and Que.), ***canadensis*** (Ottawa).

Provancher described *calidus* from a specimen which I sent to him, and although I cannot now remember the insect, the description shows that it is very close to the species since described by Ashmead as *pulcher*. Perhaps the latter may be only a variety.

NEMATUS PALLIDIVENTRIS, FALLEN—A FRESH IMPORTATION.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

In September of last year I discovered the larvæ of a species of *Nematus* feeding upon a willow introduced from Russia by the late Mr. Charles Gibb. Like others of the genus these larvæ were gregarious and threw up the hinder parts of the body when disturbed. They were full fed and buried themselves on September 24th. The flies appeared in the end of March. The following is a description of the insect:—

Full-grown larva.—One inch long; head dark brown; body pale green above with numerous black dots, pale greenish-yellow underneath; anal segment yellow.

Pupa.—Enclosed in a dark brown cocoon, less compact than that of *N. Erichsonii.*

Imago.—Length of body four lines; expanse of wings six and a-half lines; head and thorax black; antennæ brown; ocelli prominent, stand out like black heads; legs honey-yellow, tarsi of hind legs brown; abdomen pale orange, with a dorsal line of triangular spots—a spot to a segment—the obtuse angle of one spot approaching the middle of the base of the next, and so on to the end.

I submitted the perfect insects to the Reverend Abbé Provancher, and he has kindly informed me that after careful examination, and comparison of them with specimens of his own collection, he has come to the conclusion that the species is *Nematus pallidiventris*, Fallen, of Sweden, France, etc., and that it is a new addition to our Hymenopterous fauna. The insect, he says, is very near to several of our American species but identical with none.

Should this new importation become established in this country, it will be interesting to watch its progress.

NOTES.

A CORRECTION.

In Entom. Amer., Vol. VI., p. 173, in my description of *Euchaetes conspicua* there is erroneously inserted: "This insect comes near *E. cadaverosa*, Gr.," etc., etc. [illegible] "This insect comes near *E. abdominalis*, Gr. It is [illegible]y its conspicuous costal lines. *E. abdominalis* is a Flori[illegible]his seems to be the Colorado representative." Entom. Ame[illegible]ised to appear, you will confer a favour on me by publishing this i[illegible]steemed paper.

B. NEUMOEGEN.

NOTE ON AMM[illegible] ROBUSTA.

Sept. 20, 1890, I was collecting [illegible] the sunny side of a railroad embankment, where several species of [illegible]gger wasps were plentiful. I stopped to watch the operations of a female of the above species. She was opening a filled-up hole, and soon pulled out a larva resembling that of the cabbage *Plusia*, nearly grown. She laid it three or four inches from the hole, and was standing over it, apparently resting, when another wasp of the same species alighted about six inches away, and, without an instant's hesitation, attacked No. 1, which had turned to face the assault. The fight which ensued was of the most spirited character. They "clinched" at the first onset, and remained in that position, their ventral surfaces in close contact, and the body of each closely embraced by the fore and middle legs of the other. One had grasped the neck of the other with her mandibles, and both were striving to use their stings, their abdomens being curved so as to bring these weapons into favorable position. These details I gathered one at a time, for they did not lie still by any means, but went rolling, scratching, and buzzing down the side of the embankment. On account of grass stubs (the vegetation had been burned off) their progress downward was not rapid, and after nearly a minute they were about two feet from the starting place. Neither seemed to have gained any advantage. At this point a third specimen arrived, and threw herself upon the other two. The fight was now more vigorous, if possible, than before. After a few seeonds one released herself and flew away. A second soon followed suit. The third, apparently under great excitement, dashed wildly about, seeming to be looking for the larva before mentioned. From this I supposed her to be the one I first observed.

She passed within an inch of it several times, but seemed not to see it. After a minute or two one of the other combatants (as I suppose) alighted and resumed the fight, but soon left again. At this time, as I feared that the last one was about to leave also, I captured her. Whether the hole was of her own making in the first place, or belonged to one of the other contestants, or to none of them, I had no means of ascertaining; but there was evidently a bold attempt at robbery somewhere in the incident.

Brookings, So. Dak. J. M. ALDRICH.

EXCURSION.

The entomologists of New York, Brooklyn, Newark, Philadelphia and localities near these cities are invited to attend the second annual field meeting to be held under the auspices of the Entomological Societies of the cities at Jamesburgh, N. J., on July 4th, next. Jamesburgh is on the Amboy Division of the Pennsylvania R.R., and may be reached from N. Y., *via* Monmouth Junction, at 7.20 a. m.; Newark, 7.50 a. m.; Philadelphia, Broad St., 6.50 a. m.; Camden, 7.00 a. m. Later trains leave N. Y. *via* Rahway and Philadelphia, on the Long Branch Division, but it is urged that the early train be used, as this will bring the party into Jamesburgh at the same time. All those desiring or expecting to attend will please notify one of the members of the committee, from whom also further information can be obtained. The notification is important, in order that proper arrangements may be made at Jamesburgh. Committee:—C. P. Machesney, 65 Broadway, N. Y.; Dr. Hy. Skinner, Amer. Ent. Soc., Logan Sq., Philadelphia; Prof. J. B. Smith, New Brunswick, N. J.; H. W. Wenzel, 1117 Moore St., Philadelphia, Pa.

A CANNIBAL CRICKET.

On September 11th, 1889, I observed, on a grassy slope, a short distance north of this city, a large ♀ black cricket, *Gryllus neglectus*, feeding on a recently killed ♂. I observed her carefully for a few minutes. There was a large wound on the side of the abdomen of the ♂, and she was greedily eating the semifluid and soft parts. She was not easily alarmed, being very intent on her meal; but, when I disturbed her with the handle of my net, she seized hold of her gentleman friend and lugged him away several inches and again resumed her meal. On the same slope, a few yards away, I observed another ♀ gnawing at the thorax of what most likely was a ♂.

I failed to determine whether the ♂'s had died a natural death, or had been butchered by their wives. I had not noticed this cannibalistic habit before, but this may account for the many fragments of this species always common towards the fall season. I have often noticed the cannibalistic habit of the larvæ of *Pyrameis cardui*, and other butterflies while feeding in captivity. I never knew them to kill each other, but if one got injured so that the , the others seemed to relish it very much, and continu ntil completely exhausted.

WM. BRODIE, Toronto.

NOTE ON AMBLYOP LLIPES, HALD.

In 1885 among material sent to A Provancher was a curious ant, of which two examples had been fo ime in my collection, obtained apparently by moss-sifting. The a xpressed astonishment at the occurrence of such a species in Ca tating that it belonged to the genus *Amblyopone*, and that it would e type of a new species which he proposed to call *A. canadensis*. He subsequently (Add. Faun. Hym., p. 240) described it as the worker of *A. binodosus*, believing it to belong to the same species as a male formerly described by him (Nat. Can., XII., p. 205), as a braconid under the name *Arotropus binodosus*.* During subsequent seasons I searched carefully for this species without success, and almost despaired of determining its habitat. This season, however, I have been more fortunate, and on the 19th April was much pleased at finding one worker under a stone about two miles west of the city. A few days later—30th April—on the opposite side of the Ottawa, near Hull, I found in a rotten log a colony composed of several workers and about a dozen larvæ. Consigning four adults to my killing-bottle, I placed the larvæ and their remaining guardians in a box with a quantity of the damp, rotten wood in which they were found. A vigorous search in the vicinity resulted in the discovery of two similar colonies in another log, which were also taken. Should I not succeed in obtaining females and males from the larvæ then obtained, I will hope to do so by searching in June in the same locality. The ants are very slow in their movements, and walk with the quadrate flat head held horizontally, and with the long mandibles open, thus seeming much larger than killed specimens, in which the head is deflexed. The larvæ resemble those of *Myrmica*, but are not so pubescent as the only species, *M. lævinodis*, Nyl., of which

* Cresson in his list refers *Arotropus binodosus* to the genus *Ponera*.

I had larvæ for comparison. An examination of my workers by Haldemann's description of *A. pallipes* convinces me that they belong to that species. Haldeman states that the species is found in stumps in June.

W. HAGUE HARRINGTON.

BOOK NOTICES.

ANNUAL REPORT OF THE EXPERIMENTAL FARMS: Ottawa: pp. 314; 1891.

The Director of the Experimental Farms of the Dominion of Canada has recently issued his report for the past year, and a very interesting "blue book" it is. The record of experiments with two-rowed barley is particularly valuable and important at the present time, and concerns everyone who is interested in the welfare and prosperity of this province. The reports of the Agriculturist, who treats especially of Dairying, of the Horticulturist, Chemist and Poultry Manager, are all useful and instructive; but the one which especially interests us is, of course, that of the Entomologist and Botanist, Mr. James Fletcher. His share of the report occupies over fifty pages, and is illustrated with some wood cuts of noxious insects, and nine beautiful full-page plates of various useful grasses. The insects treated of are the American Frit Fly *(Oscinis variabilis)*, the Cabbage Maggot *(Anthomyia brassicæ)*, the Diamond-back Moth *(Plutella cruciferarum)*, whose larvæ attack the leaves of cabbages, the Mediterranean Flour Moth *(Ephestia Kühniella)*, the Pea Weevil *(Bruchus pisi)*, the Strawberry Weevil *(Anthonomus musculus)*, and the Vancouver Island Oak Looper *(Ellopia somniaria)*. In each instance Mr. Fletcher fully and carefully describes the mode of attack, and then gives the most satisfactory remedies. It is hardly necessary to tell our readers, who are familiar with Mr. Fletcher's work, that these articles are as complete and as accurate as is possible in a limited space. It is very cheering to find (p. 169) that the mill that was so badly infested with the *Ephestia* moth year before last (of which the writer was an eye-witness), has been completely cleared of the pest by scrupulously carrying out, though with no little labour and expense, the directions of the entomologist. In spite of this example, it is surprising to find that the proprietors of other mills and feed stores in the same city are too apathetic and careless to take any measures to exterminate this insect when it appears on their premises. They will soon find that such neglect means utter ruin to their business, unless they take warning in time. The remainder of

Mr. Fletcher's report is almost entirely devoted to the subject of Grasses, of which he has been cultivating for the sake of experiment over a hundred different kinds. C. J. S. B.

THE BUTTERFLIES OF NORTH AMERICA: by W. H. Edwards. Third series; Part XI.

It is hardly necessary to do more than chronicle the issue of a new part of this magnificent work. The beauty and accuracy of the plates, and the excellence and value of the descriptive letter-press are too well known to need any further commendation. The part now before us illustrates and describes the complete life history, in all its stages, of *Apatura flora*, Edw., *Satyrus Meadii*, Edw., *Chionobas chryxus*, Doubleday, with its variety *Calais*, Scudder. The last mentioned species is of peculiar interest to us, as it is found throughout the Rocky Mountains from Colorado to Canada. A most graphic account of its habits is given by Mr. Bruce, who has observed the insect for several years past. Why is it that *every* North American Lepidopterist does not possess himself of a copy of this noble work? It can hardly be the cost, for the numbers appear at such long intervals that a very little self denial even on the part of the impecunious would suffice for their purchase. While the subscriber would get a joy and treasure for life, let him think what a gratification and help it would be to Mr. Edwards to have his subscription list trebled, as it should be. C. J. S. B.

CORRESPONDENCE.

DONATIONS TO LIBRARY.

Dear Sir,—I have much pleasure in acknowledging the receipt of the following valuable addition to the books in the library of the Entomological Society of Ontario:—A generous donation from its President; Manual of Geology, Dana; Principles of Geology, Lyell; Elementary Geology, Hitchcock; Geology of the Globe, Hitchcock; Geology and Mineralogy, 2 vols., Buckland; Mineral Resources of Canada, 1890; Geological Survey of Canada; Geological Survey of Indiana, 6 vols., with maps; Geology of Canada; Principles of Zoology, Agassiz & Gould; Humboldt's Cosmos, 5 vols.; Humboldt's Views of Nature; Naturalist's Note Book; Evenings at the Microscope, Gosse; Year Book of Science and Art, 2 vols.; Annual Reports of Maine Board of Agriculture, 7 vols. J. ALSTON MOFFAT, Librarian.

Mailed June 4th.

The Canadian Entomologist.

VOL. XXIII. LONDON, JULY, 1891. No. 7.

HENRY EDWARDS.

This well-known and highly-esteemed entomologist died at his home in New York City, at 1.30 a.m., on the ninth day of June, 1891. His death was caused by dropsy and other complicated troubles, which affected the heart.

In him the world has lost an earnest devotee to science and art, and those who knew him, a kind-hearted, generous, true and sympathizing friend. In his death, entomological science has lost one of its most active and energetic workers, and his loss is deeply felt and deplored by all who knew him, and he has passed out of this earthly domain with the affectionate regret of many grateful and loving friends.

Mr. Edwards was born in Ross, Herefordshire, England, August 27th, 1830, and was destined by his father to become a lawyer. After studying for some time without evincing any particular aptitude for the profession, he entered a London counting house, and frequently appeared in amateur threatricals, for which he had much talent. He finally decided, much against the wishes of his parents, to adopt the professional stage. In 1853 he embarked for Australia, where he made his first appearance as an actor, and where he passed many prosperous years. From Australia he drifted to Peru and Panama, and in 1867 he reached San Francisco, Calif. In about 1877 he made his first appearance in the east, at Boston, and finally in 1879 he came to New York. In 1889–90 he again visited his old home in Australia, from where he returned last year. During all these years he was constantly connected with the stage, until only a short time previous to his decease, when he was compelled to retire on account of his illness. At the time of his death he had just returned from a trip to the Catskill Mountains, where he was staying for his health, and three and a-half hours later he entered into rest and the everlasting silence.

As an ento[mo]logist, Mr. Edwards was world-known, and was considered one o[f] he greatest authorities of the science, to which he was attached ever[y] ce his boyhood days. He was chiefly known by his excellent pap[ers] on the Pacific Coast Lepidoptera, which contain the descriptions of many new and interesting species from that region. He was also known by his articles on North American Ægeriadæ, of which family he described m[any] ican species. Besides these papers he has also writ[ten] rticles on descriptions of new species and transformatic[ns] era. He also edited three volumes of the journal " Pa[pilio]" st large work he published was his " Bibliographical Ca[talogue] Described Transformations of North American Lepidoptera," w[hich] ow in the hands of all our working entomologists. Mr. Ed[wards] t much money for the increase of his collection of insects, and dev[oted] is leisure time to his favourite study. His travels afforded him m[any] e opportunities for collecting material for his collection and writings. The collection consists of about 300,000 specimens of insects of all the orders from all parts of the globe. It contains the types of all the species he described, about four hundred and fifty, except a few which are in other collections. It also contains a number of Grote's types of Noctuidæ and Pyralidæ, and many of Fish's types of Pterophoridæ, and types of other writers. It contains also the unique pair of *Oniticellus californicus*, and many other uniques, oddities and rareties of considerable value. The collection is one of the largest private collections in the world. His library consists of about five hundred volumes of entomological works, and about double the number of pamphlets, and about two thousand volumes on travels and other topics. (I am not sure about these figures.)

Mr. Edwards belonged to many scientific and other societies. He was for some time vice-president of the California Academy of Sciences, life-member Brooklyn Entomological Society, member of the Torrey Botanical Club, Players' Club (New York), Bohemian Club (San Francisco), corresponding member Boston Society Natural History, San Francisco Microscopical Society, San Diego Natural History Society, Belgium Natural History Society, etc.

He leaves a widow who deeply mourns his loss, and we would here add our condolence and sympathy and heart-felt regret to her irreparable bereavement.

New York, June 15th, 1891. WM. BEUTENMULLER.

PARTIAL PREPARATORY STAGES OF SMERINTHUS OPHTHALMICUS, BD.

BY G. H. FRENCH, CARBONDALE, ILL.

After First Moult.—Length .45 inch. Cylindrical, head with an elevated point upwards, in a subpyramidal point, the top in two points and about a third higher than the body; when at rest the jaws under back part of head with the point obliquely forward. Eight transverse wrinkles to each joint; green studded with pale green points; a subdorsal pale line, as usual converging to caudal horn; on sides, oblique pale lines that nearly coincide with a series on the dorsum; the pale parts yellowish-green; caudal horn reddish tinted; head with a pale stripe on each side of face, the two coming together above. Previous to the next moult, smooth, the oblique lines showing very pale; the oblique stripe and caudal horn creamy-white; the anterior base of horn reddish. Duration of this period 5 days.

After Second Moult.—Length .90 inch. Colour green, a little dull and rather blue-tinted; each joint with 8 transverse folds that are studded with yellowish-green points that are but little lighter than the ground, a subdorsal line made of these points; a dorsal line and oblique stripe of the darker green without points, these lines defined by the points, on the sides below subdorsal line a similar stripe defined posteriorly by a row of these points more yellowish than the dorsal, the stripe that runs to the caudal horn creamy-white, as is also the caudal horn; the latter short hairy. Head pointed above as before and also the side of the face with a line of points more yellow than the last oblique stripe; thoracic feet red-tinted. Duration of this period 5 days.

After Third Moult.—Length 1.25 inches. Green, slightly bluish; head still pointed but not quite so prominent as in preceding stages, the stripe rounding at the top; bluish-green, stripes yellow; stripes on back and sides as before; caudal horn pale bluish purple, more blue at base, the stripe from this down the sides very pale lemon yellow; prolegs concolorous; thoracic legs paler, red tipped, stigmata black ringed, centre creamy. Duration of this period 5 days.

After Fourth Moult.—Length 1.40 inches. Bright green of a yellowish tint; head blue-green; granulations more white; side stripes yellowish-green, the one that extends to the caudal horn creamy, with a

slight greenish tint; caudal horn purple-blue, except the sides which are a continuation of the lateral stripe; jaws black, clypeus and anterior feet pale red; head blunt, stripe yellow; stripes on anal appendages yellow. Duration of this period 6 days.

Chrysalis.—Length 1.35 inches; to the back of wing cases, .64 inch; and this extends to posterior part of joint 5; depth through joint 5, .42 inch; through 4, .40 inch; through 3, .39 inch; through 2, .37 inch; end of tongue case, .55 inch from the anterior end. Cylindrical, tapering gradually back from joint 5, cremaster triangular tuberculate, especially on the dorsal part and on sides at base, round dorsally and flattened ventrally, no hooks but slightly forked terminally; head rounded. Colour chestnut-brown, nearly uniform; wing, tongue and leg cases a little darker than the rest; the abdomen slightly punctured. Duration of this period 15 to 17 days.

A comparison of the pupæ of this species with *Geminatus* shows the following differences:—The cremaster on *Geminatus* is triangular, more slender, less roughly tuberculate dorsally and laterally; this in *Ophthalmicus* having a distinct tubercle each side at the base that is lacking in *Geminatus*. The cremaster in *Geminatus* is nearly conical by reason of its being only slightly flattened ventrally, while in *Ophthalmicus* it is distinctly flattened ventrally, and dorsally is contracted at the base. A chrysalis of *Geminatus* measures as follows: Length 1.15 inches; depth through joint 5, .40 inch; joint 4, .38 inch; joint 3, .37 inch; length to end of wing cases, .60 inch; to end of tongue case, .48 inch. A comparison of these figures with the measurements of *Ophthalmicus* shows a different proportion between the two pupæ. The pupa skin is about twice as stiff in *Geminatus* as it is in *Ophthalmicus*. Besides this, the larva of *Ophthalmicus* differs from that of *Geminatus* in being less cylendrical, the third and fourth joints being enlarged, thereby making it resemble the larvæ of *Everyx Myron*.

The food plant is the same as that of *Geminatus*.

The larvæ from which the above descriptions were made were received from the Hon. C. F. McGlashan, of Truckee, California. They were sent as eggs June 17th, 1889, but were received hatched June 22nd. The imagines were produced August 2nd and 3rd of the same year, making a total period from egg to imago, of the summer brood, of 47 days. The time of hatching shows that there are two broods in a season.

ABOUT PSEUDOHAZIS AND ITS VARIATIONS.

BY B. NEUMOEGEN, NEW YORK.

The genus *Pseudohazis*, Gr. & R., has only two typical representatives so far known, one being *Eglanterina*, Bd., with the purple colouring, and the other the white *Hera*, Harr., from Utah's salt regions. *Hera* has to be considered a distinct species, for, aside from its white colour, its primaries are falcated, while those of *Eglanterina* are broad and blunt. All the rest of named insects are variations of *Eglanterina*,—*Pica*, Walk., being especially recognizable by its heavy black markings and black basal areas. I have added to our list to-day the beautiful *Ab. Denudata* already figured in Strecker's book No. 15, but not described, and of which I possess a striking example, and a constant variation of *Hera* from Oregon, which I name *Marcata*. Both insects are herewith described.

Our list of this genus to the present day stands as follows :—

Eglanterina, Bd.
- var. *Shastœnsis*, Behr.
- " *Nuttalli*, Streck.
- " *pica*, Wlk.
- " *Arizonensis*, Streck.
- ab. *denudata*, Neum.

Hera, Harr.
- var. *Marcata*, Neum.

Eglanterina ab. Denudata.

Head, thorax, primaries and secondaries above and below of rich yellow; nearly denude of all markings. Abdomen yellow with black segmentary bands. Primaries, black costa, a beautiful rose tinge at base and along costa to apex, as well as along interior margin. Apical tip black, fading inwardly; a little black dusting, indicating location of discal spots and costal terminus of mesian bands respectively. Submedian cells tinted with light rose. Secondaries with black costa and black dusted discal spots. Very faint indication of mesian band and basal black field. Below, primaries and secondaries uniformly rich yellow, with rose tints at apical part of costa of primaries, and on upper half of secondaries. Abdomen tinted with rose; costa of primaries pronouncedly black, and black spots indicating costal terminus of mesian band and discal spot. Secondaries, costa black and light black indications of mesian band and

discal spot. In both wings the nervures are accentuated with black, especially at intersection with exterior margins ; black marginal lines and yellow fringes.

Habitat—California.

Type, ♂. Coll., B. Neumoegen.

The specimen figured in Strecker's Rhopal. and Heter., No. 15, plate XV., fig. 9, but not described, is an *Ab. Denudata*, with markings a little more pronounced than in my specimen.

Hera, var. *Marcata.*

Antennæ dark brown. Head, prothorax, patagiæ and legs light yellow. Thorax the same, with blackish ground. Abdomen white, with black segmentary bands ; lower border of each segment as well as anal tuft of bright yellow. Primaries pure white. Costa, apices and fringes black. The intersection of each nervure at exterior margin accentuated by black dashes, pointing inwardly. A prominent black mesian line and a large black discal spot, faintly showing the white kernel. A basal dash encircled by a black outwardly-curved line from inner margin to costa, terminating in an irregular costal spot.

Secondaries pure white with black marginal line and fringes interspersed with black, a large black discal spot and mesian line ; the latter curved outwardly near median nervure so acutely as to give the line nearly a triangular shape. In some specimens the ends of discal spot are confluent with mesian line. Below, primaries and secondaries pure white with markings as above. Abdomen with black lateral dots and black segmentary bands. Secondaries with black costa and termini of nervures slightly tipped with black ; a black irregular line encircling basal space.

Types. Coll., B. Neumoegen.

Habitat—Klamath County, Oregon.

This handsome variation is so decidedly marked as to be distinguishable at first glance from the typical *Hera* by the entire absence of black terminal dashes of nervures of secondaries and the lack of black basal tinges.

I have about fifty specimens before me all uniform in appearance.

THE MALE GENITALIA AND THE SUBDIVISIONS OF AGROTIS.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

It is forty years ago since Lederer used the male genitalia to group the European species of *Agrotis*. According to the latest general work on the subject, the 127 European species of *Agrotis* fall into nine groups, characterized chiefly by changes in the form of the male genitalic appendages. The failure to correlate these European groups with the American subdivisions of *Agrotis*, prevents me from considering Prof. Smith's recent revision as complete, since I have demonstrated the near relation between the two faunæ exhibited by *Noctuinæ* of the Old and New World.

The characters drawn from the male genitalia must be ranked with those from the antennæ. They are sexual or secondary characters. On this account to use them as the sole basis for generic separation is hardly necessary. The genitalia in the *Noctuidæ* are found to differ markedly in otherwise very closely related species. In other species, easily distinguishable, they are practically of the same pattern. Undoubtedly we must know and study all the parts of an insect, but no single character will enable us to classify an order. It will be found as impracticable to classify the moths by their tails, as by their wings alone or chiefly, as attempted by Herrich-Schæffer. Among the representative species this change in the structure of the genitalic appendages is instructive and indicative of their morphological value. The European *Agrotis augur* is a well marked and tolerably isolated species, presenting peculiarities in shape, size, colour and pattern. In all these respects the American *Agrotis haruspica* is nearly its exact counterpart. As the basis of separation of the two, the immature stages not having been used, we have a tendency to obsolescence of certain markings and perhaps a hardly perceptible change in the exact shade and average size in *haruspica*. Now the genitalia are shown to differ in pattern as well. From this fact we must logically conclude that the genitalia are more easily impressed and changed by environment than colour, size and pattern, or other structure. Consequently the genitalia are subject to variation, and the question rather comes up, are the characters drawn from the male genitalia of specific value? The true ground for considering the two species distinct is that they do not interbreed and produce each other, and that

so far the American examples may be picked out by experts. When these conditions can no longer be fulfilled there would be no ground for retaining a different name. The mere fact of their inhabiting different continents is not sufficient, they must breed true to type and not produce each other. Then we can be sure we have to do with separate cycles of existence and we can catalogue the fact. As the genitalia are concealed, their structure is not so apparent, and it is clear that repeated observations are necessary to verify the statements drawn from solitary dissections. But granting what has been published as substantially reliable, there yet remains the test of breeding to be applied to the genitalic species. We have an instance in the genitalic species of *Nisoniades*. These butterflies have not been bred to ascertain if they remain true in their genitalic peculiarities, if one genitalic type does not produce the other, if the caterpillars show no differences. Until all these matters are cleared up we can arrive at no final conclusion as to the value of genitalic characters, as to which single observations must be checked by repeated experiments. Writers on the subject have apparently proceeded on the basis that the male genitalia are formed, not by deposits of chitine but of cast iron, moulded so as to fit and give at last a stable and firm reality to our artificial system of classification. Vain expectations! The characters, on which we are obliged to found all our categories, are one in quality and only differ in quantity; what is generic is specific also, and what is specific is varietal.

In my Buffalo lists, 1874-1876, I was at some trouble to give the generic types of the Noctuidæ, and my action, unless it can be shown that I was in any one case in error, is binding from those dates. Prof. Smith was, therefore, no longer free to retain *Peridroma* for *occulta*, as I accepted *Eurois* for that species, without showing my action to have been at the time unwarranted. To place my *A. pellucidalis* in the same "genus" with *occulta*, and on account of the genitalia, is not to be defended. The variability of the genitalia cannot be made a basis for generic separation nor their agreement for generic grouping without other characters. The two insects are strongly different in form and vestiture, the hindwings being in the *Anicla* group translucent, where I would refer my species. The work of Prof. Smith bears proof, from internal evidence, that the intention was at first to consider but one genus, *Agrotis*. Not only are the "genera" called "groups" in the body of the text on

occasion, but in the case of *Agrotis pellucidalis* the change of title has been forgotten. According to Hofmann the type of *aplecta* is *prasina*. I have made the following types of named subgeneric divisions: *occulta* of *Eurois*, *alabamæ* of *Anicla*, *lewisii-tessellata* of *Pleonectopoda*, *mærens-citricolor* of *Carneades*, *catherina* of *Matuta*. These must first be used before new titles are coined. There remains a literary research as to the oldest generic titles used in Europe for species of *Agrotis in sensu* Lederer, which is not in any sense a superficial assemblage, but a scientifically and properly assorted genus of *Noctuidæ*. The question as to the rank of the species with tuberculate clypeus may be separately considered. On my discovery of the character I made it, as elsewhere, the basis for a distinct genus. Had I had then the material and the time I would certainly have continued my observations and extended the limits of the genus, which has grown to unexpected dimensions in Prof. Smith's work.

In my Revised Check List I accepted several forms as varieties which Prof. Smith shows to be distinct species, thus reverting to my original opinion respecting them which I had incorrectly modified from information received subsequently. With regard to these and to the representative species, now definitely separated as distinct upon distinctions found in the male genitalia, Prof. Smith's observations may be accepted as corrections of my list. It is not my intention here to review the whole of Prof. Smith's brochure, merely to point out certain misapprehensions and, as I think, wrong identifications, which in the future, if uncorrected, may render the synonymy uncertain. Similarly I avoid any reply which might take the shape of controversy, confining myself to matters of fact, as I understand them, and referring the student to my published papers for all special cases of difference.

A prominent feature in Prof. Smith's treatment of the species is his referring names designating recognizable varieties as simple synonyms. Even when intermediary forms exist, as they do in very many cases of variation, the names for the extremes for the pronounced varieties, should be retained to designate them exactly. Colour varieties, as for instance the bright red *specialis*, in contradistinction to the olive-grey *Wilsoni*, *gularis* as distinguishable in a similar way from *ochrogaster (turris)*, might, with advantage, be designated. In a few instances where the differences remain, in my opinion, of specific value, the names are made equally synonyms. The most prominent instances of this are

Clodian fig. 10, and *semiclarata*, Essay, fig. 9. This latter is smaller a ıter, bright reddish-brown, with a thick black basal dash absorbing the ıong claviform, the hindwings dark above, beneath half-pale. The former is stouter, obscure purplish-brown with a yellow tinge, the male with yellow streaks; the claviform is reduced, no black basal dash, hindwings soiled white with diffuse terminal shadings, beneath wanting the character (female is still more obscure, the markings of primaries ences between these two forms seem certainly specific. In List I have besides accorded specific rank to the following names, w in the revision are put down as varieties or synonyms: *Brunneipe is, orbis, lætula, cloanthoides, balanitis* and *verticalis*. As regards *brunneipennis*, I incline to believe that we may have a second eastern species smaller than *cupida*, and variable in colour. The larger specimens from Texas are published with the use of my description by Prof. Smith, under the name *Belfragei*, and probably this is the correct view. From Prof. Lintner's remarks it seems that *cupida* is more constant in size than I thought it, although more variable in colour.

As to *orbis* and *lætula*, they are referred by Prof. Smith as synonyms of *cupidissima*. But what Prof. Smith describes as *cupidissima* is most certainly not that species but *orbis*. *Cupidissima* is really and originally founded on three specimens with open orbicular and faint, shaded markings. A fourth, which had no discernible markings, need not concern us here. I thought it a variety. I cannot account for the statement that I have confounded two distinct species, one with the orbicular open, the other with the orbicular closed. Most assuredly, so far as I can see and remember, and both originally in the CANADIAN ENTOMOLOGIST and subsequently in the bulletin of the U. S. Geol. Survey, I have described *cupidissima* with the orbicular open. On the other hand I had only the type of *orbis*. This is a smooth olive-gray species, with slightly paler terminal field, and which may be held the Californian representative of *alternata*. The orbicular is small, spherical, pale-ringed; the closed round orbicular suggested the name *orbis*. I am quite confident that *orbis* and *cupidissima* are distinct species, while it is almost certain that Prof. Smith has failed to recognize *cupidissma* under my name for it, while both this and *lætula* may figure as new species in the section of *Rhyncagrotis* with open orbicular. As to *cloanthoides*, Prof. Smith says *albalis* of Dr. Bailey's collection looks like a washed-out specimen of

cloanthoides. I have no special knowledge now of the specimen referred to, but I believe the Nevada specimens of *albalis* are distinct. The types in my own collection were fresh, with a white bloom, very different from the smooth strigose *cloanthoides* from Colorado, which is darker. There was nothing "washed out" about my material. As to *balanitis* it differs from *messoria* by the abdominal line, the different maculation and course of t. p. line, all specific characters. As to *verticalis*, the fact as to whether it be distinct, or only a constant form of *designata*, must be determined by breeding; I thought it distinct. In other cases, I believe Prof. Smith's large material has enabled him to properly correct the synonymy of the list.

I would certainly retain the name *tricosa* of Lintner. In my New Check List of 1882 I say, in a note to this species, p. 24: "This form should perhaps bear Guenée's name, being later separated from Guenée's *jaculifera* than *herilis*. The typical form of *jaculifera* exactly corresponds to *subgothica* of Stephens." And Prof. Smith, without giving me credit, prefers the name. Mr. Butler says positively, according to Prof. Smith, that *tricosa*, Lint., is typical *juculifera*. Now Guenée happens to figure typical *juculifera* and he figures typical *subgothica!* Prof. Smith does not quote Guenée's illustration, which contradicts both Butler's statement and his own course. Guenée's types of "*juculifera*" or so-called "types," were several in number at least, as he included two other species as varieties. One of these so-called types Mr. Butler may have and this may be a *tricosa*, Guenée's var. A. Guenée made three mistakes as to his material: first he described and figured *subgothica* as *jaculifera*; then he described specimens belonging to two different species, *tricosa* and *herilis*, as varieties of *jaculifera*. Under no circumstances can Butler's statement be correct, while I submit that it is unfair both to Prof. Lintner's acumen in contradicting the conclusions of Guenée and the figures of "The Practical Entomologist," and to an exact interpretation of the names, to resuscitate *jaculifera* at the expense of *tricosa*.

Agrotis morrisonistigma, Grt.—According to Prof. Smith, Mr. Morrison's so-called "type" of this species does not agree with the specimens returned me by Mr. Morrison. The species figured by me as *exsertistigma*, will therefore have to be known by the name *Morrisonistigma* proposed by me in Buffalo Bulletin for this eventuality. The "types" of *exsertistigma*, Morr., came originally from me, and it appears that Mr.

tributed different species under this name. As I figure one of the name might have been allowed to remain as fixed by-me. Si Prof. Smith has overturned my determination of course the above name must be used and not a new one as attempted in the "revision."

In conclnsion, *Agrotis costata* is a near and close ally of *idahoensis* and does not belong with p. I have always associated the two, describing in fac paratively with the former, of which I had but a single po ough in my lists I have placed the two together wrongly. The des ion was misplaced, and the words "resembles the preceeding" bec e thus misleading. But the description is clear enough; it is a with pallid costa, hence the name. I hope that figures may d of my types in the collection of the British Museum not know Smith, so that every point may be cleared up. As these unknown are, proportionately speaking, few, there should not be any great in the matter.

DESCRIPTION OF A MUSCID BRED FROM SWINE DUNG, WITH NOTES ON TWO MUSCID GENERA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

(Read before the Entomological Society of Washington, Feb. 5, 1891.)

On Dec. 14, 1890, I secured from the upper Piney Branch region (District of Columbia) a small quantity of swine dung that had been dropped in the edge of open woods, and seemed to be old enough to contain with probability larvæ or puparia of Diptera. This was placed in a large glass jar, with a few inches of sand in the bottom, occasionally moistened and kept in a moderately cool room in the house. The dung was soon noticed to be full of larvæ, which in a short time crawled out of it entirely, clustered on the inside of the glass, or worked themselves down into the sand, manifesting a considerable migratory instinct, no doubt induced by the moisture and mild temperature. Up to Feb. 1st about a dozen specimens of the perfect fly had issued, there being only one species. It belongs to the genus *Cleigastra* in the ***Cordyluridæ***.

This genus, in the sense of Schiner, differs from *Cordylura*, for which it might easily be mistaken, by having the arista naked or only short pubescent, and the wings very distinctly longer than the abdomen.

Cordylura has the arista feathered, and the wings as long as, or shorter than the abdomen, though some of our American species may have them somewhat longer. *Cleigastra* might also be mistaken for an Anthomyiid, particularly of the genus *Cœnosia*, to which it bears much resemblance. It may, however, be distinguished from that genus by having six abdominal segments. The *Anthomyiidæ* have only four or five abdominal segments, usually four. The eyes of *Cleigastra* also are nearly round, while in *cœnosia* they are elongate. A large number of descriptions of North American species of *Cordylura* and *Cleigastra* have been lumped together in the O. S. catalogue under the genus *Cordylura*. Loew described nearly all of these. Reference to these descriptions in most cases shows to which genus they belong. Though the separating characters of the two genera may seem insufficient, the division is warranted by the considerable number of species. There are also in the catalogue one or two errors which should be corrected. I give at the end of this paper a revised list of the N. Am. species of the two genera as they should appear, based on the character of the arista as learned by consulting each description, omitting the repetition of references contained in the catalogue, except two corrections.

Reference to the descriptions of all the N. Am. species failed to identify the present form, which is described below. The breeding of this species as above detailed indicates that the last brood of larvæ may reach full growth at the time winter sets in and hibernate in the larval state in the dung. With the milder weather and rains of spring such larvæ entirely abandon the dung to pupate in the earth. I have specimens of the same genus captured in this vicinity (District Columbia) from the 3rd to the 8th of May. It is extremely probable that many of our coprophagous Diptera winter equally in the larval and pupal state. *Hæmatobia*, *Lucilia* and *Musca* are familiar examples, which I believe may winter either as larvæ or pupæ. In a state of nature the flies themselves rarely winter.

Cleigastra suisterci, n sp.

Imago. ♀. Brownish cinereous. Head brownish or yellowish, nearly round, elongate behind ; eyes blackish, round ; frontal vitta very dark reddish brown, W-shaped, cleft behind, almost reaching the eyes in front on each side ; front very broad, not quite one-half the width of the head, with bristles on each side, and longer erect bristles on the vertex ; antennæ not quite

so lo[illegible]ace, first joint very short, black; second joint much longer, yellow[illegible]third joint not twice as long as the second, blackish; arista black, a[illegible]ost naked, only very short pubescent; vibrissæ black, strong; probosci[illegible] black, stout; palpi elongate, club-shaped, light yellowish or reddish, bristly, terminal bristles usually black; occiput convex, cinereous brown, black bristly on the sides above, gray hairy below; cheeks and face lighter, sometime[illegible]. Thorax cinereous brown on the sides and below, pube[illegible]s; darker above, not pubescent, but with black bristles that[illegible] behind, and four longitudinal, brown, dorsal lines, the outer two [illegible] times obsolete; scutellum concolorous, with four black marginal bristles. Abdomen brownish cinereous, black bristly on the borders of the segments, and black hairy on the whole surface. Legs reddish or yello[illegible]h; femora not much enlarged, short bristly, usually largely cinereous; tibiæ with strong black bristles, especially the hind pair; tarsal claws black, moderately long. Wings subhyaline, the costal portion slightly tinged with yellowish, especially near the base, the anterior and posterior transverse veins clouded with black; all the veins blackish, at least toward the apex of the wing, delicate, except the thickened first longitudinal and transverse humeral veins; tegulæ not large, nearly circular, glassy, with a light brownish border and a long fringe of light hair; halteres yellowish.

♂. Differs from the female in the front being narrower, but considerably more than one-third the width of the head; and the abdomen thinly woolly or pilose, without bristles.

Length of body 6 mm.; of wing 6 to 6½ mm.

Described from one female and three male specimens. District of Columbia.

Larva (full-grown). Dirty yellowish white, long, cylindrical, of equal thickness, tapering slightly at the posterior extremity, more markedly so at the head, composed of 12 segments including the cervical and anal, each segment transversely wrinkled. Head small, corneous, one-half the width of middle segments, irregularly very short ovate in outline from above, light brownish above and below, with a dark brown margin posteriorly both above and below; above with two light dividing lines diverging from the centre of the posterior margin outward to the antennæ, which appear as short, minute, raised points of a darker color, apparently 3-jointed; mouth parts dark brown, nearly black. Second segment

(counting the cephalic the first) longer than the head, a little narrower than the third segment, with a deep scallop on the anterior margin above, into which fits the head, forming an anterior lateral dark brown spinous process on each side of the segment; third segment of nearly full width, shorter than the second; fourth and fifth segments of equal length, shorter than the third; segments six to ten nearly equal in length, one and one-half times so long as four and five; segment eleven slightly longer, a little narrower than the tenth; anal segment about one-half so long as the eleventh, in some specimens very light, in others dark brown or nearly black, sculptured, narrowed posteriorly, anterior upper margin raised, posterior portion 4-cleft behind exhibiting a pair of processes above and below.

Length about 8 mm.; width nearly 1 mm.

Described from several alcoholic specimens.

CORDYLURA, Fall., Spec. Ent. etc. (1810).

angustifrons, Lw.
bimaculata, Lw.
confusa, Lw.
flavipes, Lw.
gagatina, Lw.
glabra, Lw.
gracilipes, Lw.
latifrons, Lw.
lutea, Lw.
munda, Lw.
picticornis (not *pictipennis*), Lw.
pleuritica, Lw.
præusta, Lw.
scapularis, Lw.
setosa, Lw.
terminalis, Lw.
vittipes, Lw.
unilineata, Zett.

CLEIGASTRA, Mcq., Hist. Nat. Dipt. II. 384 (1835).

acuticornis, Lw.
adusta, Lw.
albibarba, Lw.
capillata, Lw.
cincta, Lw.
cornuta, Lw.
fulvibarba, Lw.
gilvipes, Lw.
hæmorrhoidalis, Meig.
impudica, Reiche. Bull. Soc. Ent. Fr., 1857, p. ix. (not p. 77).
inermis, Lw.
megacephala, Lw.
nana, Lw.
tricincta, Lw. Centur. IX., 85.
? variabilis, Lw.

NOTE.—*Cordylura qualis*, Say, does not belong anywhere in this family.

IPTIONS OF THREE NOCTUID LARVÆ.

BY HARRISON G. DYAR, NEW YORK.

The moths bred from the larvæ here described were kindly determined for me by Prof. J. B. Smith.

Tæniocampa alia, Guen.

Stage I.—Head s mouth orange; ocelli black; width, .3 mm. The abu ell developed only on joints 9, 10 and 13, so the larva wal trid. Body whitish, appearing green from the food within, with m ck, piliferous dots. Joint 12 is a little enlarged; cervical shield colou ed like the head, but paler. Length, 4 mm. This larva was found M y 3.

Stage II.—Head shiny, whitish; oce i black; mouth brown; width, .6 mm. Body dark green above, paler l elow, enlarged at joint 12; the feet on joints 7 and 8 small and unused. A dorsal, subdorsal and stigmatal white line, the latter broad and blending below with the colour of the venter. A number of minute black piliferous dots and a few fine hairs on the head. Length, 6 mm.

Stage III.—Head dull, pale yellowish-white; ocelli black; mouth brown; width, .9 mm. Body as before, the dorsal and subdorsal lines clear cut. In the subdorsal space are two white spots per segment, each with a minute black centre. The feet on joints 7 and 8 are better developed than in the previous stage.

Stage IV.—Head dull pale whitish; mouth faintly brownish; ocelli black, ringed with white; a few pale hairs; it is partly withdrawn under the skin of joint 2; width, 1.6 mm. Body pale, semi-transparent yellow, appearing green. Dorsal, subdorsal and stigmatal white lines, the lowest large and bordered above with dark green. White piliferous dots with minute black centres, about two per segment in each of the spaces. Feet normal, nearly equally developed; joint 12 enlarged. Length, 15 mm.

I think a stage occurs between stage IV. and the last stage, but I have not observed it.

Stage VI. (?), Last Stage.—Head green, with a few hairs; marked as before. Body yellowish-green, sprinkled with pale yellow; a yellowish-white dorsal line, a faint and broken subdorsal line and a narrow stigmatal line above the spiracles, except on joints 2 and 12, where it runs below.

them, passing into the anal foot. Spiracles white in a narrow black oval. Feet all present. Length, 30 mm.

Pupa.—Cylindrical; the abdominal segments slightly tapering. Cremaster, two thin, sharp divergent spines. Body punctured. Colour red-brown, darker in the sutures on the back. On the dorsum posteriorly to each of the three movable abdominal sutures, and also posteriorly to the one before them, is a transverse row of large deep punctures, becoming smaller towards the sides and not reaching beyond the dorsal half of the body. The wing cases are wrinkled. Pupation occurred in June, and the moth emerged Jan. 10 (in a warm room). It was the form *confluens*, Morr.

Gortyna cataphracta, Grote.

Mature Larva.—Head pale brown, mottled with dark brown, and with a black stripe at the side covering the eyes; mouth parts largely black; labrum pale, narrowly brown above; jaws sharply dentate on the ends; a few hairs; width, about 3 mm. A large, testaceous, cervical shield, edged with black below, and narrowly bisected by a whitish dorsal line. Body whitish, with a dull purple stripe in the subdorsal spaces, obsolete anteriorly; another more extensive lateral one, and traces of one in the subventral space. A number of brown-black blotches in two irregular transverse rows per segment, varying in size. Anal plate testaceous, shaded with blackish at the sides. Thoracic feet and spiracles black. Length, 35 mm.

Pupa.—Cylindrical; of unusual length in comparison with its diameter; obtusely rounded anteriorly; wing cases moderately prominent. Cremaster short, thick and rounded, with two sharp, divergent spines; cases creased; body segments punctured on their anterior edges. Colour reddish-brown, the body lighter. Length, 20 mm.; width, 5 mm.

Food Plant.—Rhubarb, in the leaf stems of which it bores, pupating in its burrow after biting a hole, across which it spins a few threads.

Hypena (Bomolocha) abalienalis, Walk.

Mature Larva.—Head bilobed, green; the mouth brownish; labrum and antennæ white; ocelli black; width, 2 mm. Body slender, contracted at the sutures, the skin forming distinct folds, Two rows of small warts on the cervical shield, and others on the body arranged much

as in …e, except that there are none on the last segment. They are sm…ih, each with a single black hair. Body green, with a white subdo… band. The feet are normal, divergent, but the larva walks with a …ping motion. Spiracles orange.

Pupa.—…ned in a slight web just under the surface of the ground. Cylindrical; t… abdominal segments tapering; wing cases very prominent. Cremaster, t… …slender spines, surrounded at base by several small… …Wing cases coarsely creased; body punctured. Colour … the cases almost black.

Food Plant.—Slippery e… *…lva).* The larvæ rest on the leaves, but throw themselves v… …rith contortions if disturbed.

This, as well as the two preceding sp… …ies, from Dutchess Co., New York.

NOTES.

HALISIDOTA TRIGONA, GRT.

Mr. Dyar's note and Mr. Grote's reply, concerning the identity of the above species with *speculatis*, H.-S., may make further notes interesting. Mr. Hy. Edwards informed me two or three years ago that Mr. Grote had redescribed Herrich-Shaeffer's species, and that he had a specimen. I suggested that he should print this note, and he promised to do so in connection with a number of other remarks on Bombycid species. The notes were not printed, and I made no reference to the matter in my catalogue. After Mr. Dyar's note appeared, Mr. Butler wrote me at some length giving the differences between the tropical species and North and South American forms, and mentioning others which he thought formed a distinct section at least of the genus. I saw Mr. Edwards afterwards, and stated Mr. Butler's indisposition to accept *trigona* as =*speculatis*. Mr. Edwards adhered to his original conclusion, and fortified it by stating that he had examined and compared the specimens in the British Museum, and felt sure he was right. The existence of several closely allied species is indicated by specimens in Mr. Neumoegen's collection, and it would seem to be hazardous to unite species from a comparison of a picture and description merely. Mr. Edwards's comparisons, made in the British Museum, stand on quite a different base, but we must wait until he gives us his notes before putting *trigona* into the synonymy.

J. B. SMITH.

DASYCHIRA LINTNERI, GRT.

Recently on a visit to Plattsburgh, N. Y., I noticed in the collection of my friend, Mr. G. H. Hudson, four specimens of a *Gluphisia* new to me, similar to *G. trilineata* but larger and stouter, and with a yellow shade preceding the subterminal line. These were taken by Mr. Hudson as follows :—April 13th, 1890, 1 ♂; April 23rd, 1890, 3 ♂ ♂. I compared the descriptions of all our species of *Gluphisia* without finding anything to fit, but later found the species in the collection of Prof. Lintner under the label "*Dasychira Lintneri*, Grt.," and Mr. Grote's description fits the specimen exactly. From the above it will be seen that the species must be referred to *Gluphisia*, and will stand thus : *Gluphisia Lintneri*, Grt.

1877—Grote, CAN. ENT., IX., 85, *Dasychira*.

The venation is that of *G. trilineata;* three median venules ; the subcostal series crowded well toward the apex of the wing ; the independent vein of secondaries absent, but represented by a strong fold which runs to the base of the wing. It is very different from that of *Dasychira*, and it is somewhat curious that Mr. Grote should have been led to refer it to that genus, differing as it does in subfamily characters.

HARRISON G. DYAR, New York.

AGROTIS SUBGOTHICA, HAW.

Mr. Grote in his "Check List of N. American Noctuidæ," 1890, treats this as a distinct species. I do not know the American *subgothica*, which is, I dare say, a distinct species ; but why is it *subgothica*, Haw. ? I think there can be no doubt that Haworth's description applies to a well-known variety of *Agrotis tritici*, and, therefore, unless the American species is also a var. of *A. tritici* I fail to see how it can be called *subgothica*, Haw., at all. It should, in my opinion, be *subgothica*, Grote. Mr. A. G. Butler has followed this nomenclature, "Trans. Ent. Soc.," 1889, p. 377, and looks like landing us into a muddle. I drew his attention to this and other errors in the "Entomologist's Record," etc., 1890, p. 10, and on p. 31 Mr. Butler simply falls back on Grote's "Check List" as his authority without attempting to combat my view that *subgothica*, Haw., is not *subgothica*, Grote. Perhaps Mr. Grote will tell us what he knows of *subgothica*, Haw., other than as a well-recognized var. of *tritici*.

J. W. TUTT, Westcombe Hill, London, England.

BOOK NOTICE.

THE BRITISH NOCTUÆ AND THEIR VARIETIES, by J. W. Tutt, F. E. S.: Sevan, Sonneuschein & Co., Paternoster Square, London, E. C.: Volume I., 164 pages, May, 1891.

This book is characterized by the extreme care which the author has taken in describing and fixing the original form which was taken as the basis for the first specific description, and the enumeration and designation of all the varieties of the species hitherto known. It is simply invaluable to the English collector, and has in so far an interest for the American, as the species common to Europe and America are fully treated, and it is a matter of scientific importance to ascertain whether all the varieties of such species occur equally in both the Old and New World, or what varieties are peculiar to either. For clearness of treatment and precision of language the work cannot be too highly spoken of. Whether all the named varieties are constantly recurring, and sufficiently recognizable in every case is a matter for future elucidation; but it is undeniable that it is a matter of convenience that the varieties should receive special designations. In this way what are commonly called synonyms have a use in designating the particular form which they were originally intended to cover and the geographical distribution, and the occurrence of these varieties can be properly brought to light. Where a work has been prepared with so much evident care, and contains so many valuable scientifically-stated suggestions as to the phenomena of variation itself, it disarms any unfavourable criticism. It seems, however, a matter of regret that the generic terms employed are not the most correct in a number of cases, that the system of M. Guenée has been retained, and, lastly, that no account is made of possible variation in structure, neuration, armature and secondary characters. The work is well printed and will be of interest, and is hereby cordially commended to the notice of all lepidopterists.

A. R. GROTE.

*** By some oversight the name of MR. HARRY CARTER was omitted from the list of members of the Geological Section of the Entomological Society of Ontario (p. 108). As he is a very useful and active member, we regret the omission very much.

Mailed July 4th.

The Canadian Entomologist.

VOL. XXIII. LONDON, AUGUST, 1891. No. 8.

NOTES ON NORTH AMERICAN CHERNETIDÆ.

BY NATHAN BANKS, ITHACA, N. Y.

The North American genera of *Chernetidæ*, so far as recognized, may be separated by the following table:—

1 { Cephalothorax with a transverse suture; mandibles small (*Cheliferinæ*) 2
  { Cephalothorax without a transverse suture; mandibles larger (*Obisinæ*) 3

2 { Four eyes ..... *Garypus*
  { Two eyes ..... *Chelifer*
  { No eyes ..... *Chelanops*

3 { Mandibles with apophysis or stylet 5
  { Mandibles without apophysis 4

4 { Fingers straight; cephalothorax wider in front than behind ..... *Chthonius*
  { Fingers curved; cephalothorax narrower in front than behind ..... *Obisium*

5 { Eyes inconspicuous or absent ..... *Atemnus*
  { Four distinct eyes ..... *Olpium*

The two subfamilies may, I believe, be farther separated by the fact that the *Cheliferinæ* have the dorsal scutæ of the abdomen divided by a median line; while in the *Obisinæ* the scutæ are entire. *Chernes pallidus*, Banks, which was described as having the median line wanting, really has a median line, though on account of the light colour of the abdomen it is very difficult to trace. The *Cheliferinæ* have an apophysis or small stylet near the end of the mandibular finger. In the more typical *Obisinæ* this is lacking, but in *Atemnus* and *Olpium* it is present. Clubbed hairs are frequently present in the *Cheliferinæ*, while they are not found in our forms of *Obisinæ*.

Chelifer, Geoff.

In this genus the palpi are usually much longer than in *Chelanops*. A new species from Florida may be called

Chelifer floridanus, nov. sp.

Length, 2.3 mm. Colour, dark reddish brown; palpi very long, second joint with a swollen projection behind bearing two spinous processes; third joint (femur) very slender, with the pedicel somewhat distinct, twice as long as the cephalothorax is broad at anterior furrow; fourth joint a little shorter than the preceding one, very much larger at the tip than at base; claw not near as long as second and third joints together; hand not broad, fingers not much longer than hand; palpi, except fingers, with clubbed hairs. Cephalothorax granulated, with larger rounded bodies scattered over its surface; a few spines on each side. Abdomen about twice the length of the cephalothorax, widest behind the middle; lateral ends of the scutæ projecting behind and pointed; scutæ separated by a narrow line, wider behind; body with clubbed hairs. The palpi are very much longer and slenderer than in any other described American form; the tip of the fourth joint reaches much beyond the end of the abdomen. Southern Florida, E. A. Schwarz. A peculiar form from Texas may be called

Chelifer texanus, nov. sp.

Length, 2.5 mm. Colour, abdomen and legs whitish or yellowish; dorsal scutæ brownish yellow; cephalothorax and palpi reddish, not very dark. Palpi short; second joint gibbous behind, with a longer pedicel than usual; third joint distinctly pedicellate, inner margin nearly straight, outer margin convex, not over twice the length of the second; fourth pedicellate, a little shorter and larger than the preceding, inner margin strongly convex, outer margin slightly so; hand oblong oval, not very broad, and longer than the fingers. Palpi furnished with very small and delicate clubbed hairs, except on the fingers. Cephalothorax tapering and rounded in front, with delicate clubbed hairs, no spines, no larger granules. Abdomen oblong, dorsal scutæ narrowly separated by a line, with both clubbed and simple hairs.

In some points of structure this species resembles a *Chelanops* more than a *Chelifer*, but the eyes are well developed; the palpi are shorter than usual in *Chelifer*, and the dorsal scutæ do not cover the abdomen as completely as in most *Chelifers*. Brazos Co., Texas.

Chelanops (Chernes).

As shown by Simon *Chernes*, Menge is *Chelanops*, Nicolet. A new species from Long Island may be described as follows :—

Chelanops tristis, nov. sp.

Length 2. mm. Colour pale reddish-yellow, soft parts white. Second joint of palpi with two projections behind; third joint pedicellate, nearly cylindrical, twice as long as second; fourth scarcely shorter than the third, pedicellate, inner margin very convex; hand, pedicellate, broad, inner margin very convex, outer but slightly so; fingers as long as hand, curved; whole palpi furnished with only simple hairs. Body with simple hairs and a few somewhat clubbed ones near the anterior part of the cephalothorax. Legs nearly white. Abdomen oblong oval, dorsal scutæ widely separated, the dark spot much nearer the inner than the outer end. On the sea shore of Long Island, New York.

The described species of *Chelanops* may be separated by the following table :—

1 { Palpi with clubbed hairs..... 2
  { Palpi with only simple hairs..... 3

2 { Palpi as long as body, large, very pale..... ....*pallidus.*
  { Palpi not as long as body, small, dark.....*sanborni.*

3 { Fingers almost one-half shorter than hand.....*acuminatus.*
  { Fingers as long or scarcely shorter than the hand 4

4 { Dark spots in dorsal scutæ much nearer median that lateral end, scutæ widely separated.....*tristis.*
  { Dark spots at about the middle of dorsal scutæ, scutæ narrowly separated.....*oblongus.*

Garypus, Koch.

In this genus the cephalothorax is quite suddenly narrowed in front of the eyes. It has not been recorded from the U. S. Several specimens of a species of this genus were found at Ithaca, N. Y., in the crevices of a rocky cliff. The form may be described as follows :—

Grypus granulatus, nov. sp.

Length, 1.7 mm.; colour, abdomen yellowish, legs white, palpi and cephalothorax pale reddish. Palpi longer than the body; second joint short, very convex in front; third not very long, short pedicellate, gradually growing thicker; fourth predicellate, shorter than the preceding,

becoming near end a little larger than the femur; claw about as long as femur; hand not very broad, tapering towards base of fingers, which are a little shorter than the hand, and curved. Palpi, except fingers, granulated, and provided with simple hairs. Cephalothorax distinctly narrowed in front of eyes, anterior margin straight. Abdomen broad, seven scutæ separated by a line, first scuta not divided. Legs short, hind legs not very stout. Cephaloth of abdomen granulated, with simple hairs. The eyes and almost touching. Legs granulated, hind pairs but n front pairs. Found in crevices of a cliff at Ithaca, N. Y.

Chthonius, Koch.

The species of this genus are se aken in houses. They are not rare under wet or damp leaves in oods. They can move quite rapidly. Three species have been ed from the U. S., two of them from caves. The description gen for *Chth. pennsylvanicus* was quite short. A fuller descripti is and two other forms may be added.

Chthonius pennsylvanicus, Hagen.

Length, 1.9 mm. Colour, brownish with scattered silvery spots on abdomen, mandibles reddish, palpi pale reddish, legs white. Palpi slender, longer than the body; third joint (femur) reaching one-third its length beyond the cephalothorax, nearly cylindrical, slightly narrowed in middle, largest near tip; fourth joint about one-third the length of the third joint; hand not broad, tapering towards base of fingers, the latter straight about one and one-half times length of hand; femur longer than fingers. Mandibles very large, about as long as cephalothorax. Cephalothorax much wider in front than behind, about as wide in front as long. Hind eye about twice its diameter from front eye, which is about on the front margin. Abdomen narrow at base, becoming broader near tip, twice as long as cephalothorax. Hind pairs of legs very much larger than front pairs; fourth pair much longer than body, tip of femur nearly reaching to the end of abdomen. Penn., N. Y.

Chthonius longipalpis, nov. sp.

Length, 1.9 mm. Colour pale yellowish, fingers and claws of mandibles a little reddish; cephalothorax and scutæ slightly brownish, abdomen with scattered silvery spots. Palpi long and slender, longer than body; femur very slender, slightly largest near tip; fourth joint short, conical; claw slender; hand narrow, tapering toward base of fingers,

which are straight and a little longer than hand; femur longer than fingers. Mandibles large, not quite as long as cephalothorax. Cephalothorax not much wider in front than behind, not near as much so as in *Chth. pennsylvanicus;* hind eye about once or one and one-fourth its diameter from front eye, which is a little separated from anterior margin of cephalothorax. Abdomen narrow at base, growing wider near tip, end rounded, more than twice the length of the cephalothorax. Hind pairs of legs larger than front pairs; hind legs extending beyond abdomen, but the tip of the tibiæ rarely reach the end of the abdomen. Under leaves in woods, Long Island, N. Y.; Ithaca, N. Y.; Washington, D. C.

Chthonius moestus, nov. sp

Length, 1.3 mm. Colour, more reddish than preceding, silvery spots not as distinct. Palpi short not reaching end of abdomen; femur short, cylindrical; fourth joint conical; hand very short, fingers straight, about twice the length of hand, about as long as femur. Mandibles large, tapering, not as long as cephalothorax. Cephalothorax quite a little broader in front than behind, more so than in *Chth. longipalpis;* eyes close together, about touching. Hind pair of legs short, not reaching beyond abdomen. Ithaca, N. Y., under stones in spring.

The described species of North American *Chthonius* may be separated by the following table:—

1. Cave species, two or no eyes 2
   Not cave species, four eyes 3
2. Hind legs about twice as long as the abdomen ..... *packardi.*
   Hind legs not much longer than the abdomen ..... *coecus.*
3. Eyes close together, almost touching ..... *moestus.*
   Eyes distinctly separated 4
4. Hind eyes about twice its diameter from front eye, ceph. much wider in front than behind ..... *pennsylvanicus*
   Hind eye not twice its diameter from front eye, ceph. but little wider in front than behind ..... *longipalpis.*

Atemnus, Can.

The eyes in this genus are indistinct or wanting; the mandibular apophysis is present, the dorsal scutæ softer than usual, and the fourth joint of the palpi is longer than is usual in the *Obisinæ*. A species from California may be called

Atemnus californicus, nov. sp.

Length, 2.1 mm. Colour, cephalothorax and palpi reddish-yellow, abdomen and legs nearly white. Cephalothorax longer than broad, sides

nearly parallel until just before the anterior margin where they converge slightly, anterior margin very obtusely angled. Mandibles about half the length of cephalothorax, finger with a small and weak apophysis. No eyes. Cephalothorax smooth. Palpi very long; the basal joint narrower than usual; second joint slender, as long as mandibles, a very small, conical projection on outer side near distal end; third joint (femur) slender, nearly as long as cephalothorax and mandibles together, not pedicellate, gradually growing thicker from the base; fourth joint a little shorter than the third, very long pedicellate, pedicel almost one-third the length of the joint, gradually growing thicker, both sides convex, the outer more convex toward the distal end, the inner more convex toward basal end, broader than femur; hand quite long pedicellate, oblong oval, not very broad; fingers much longer than hand, curved toward the tip, with a great many very fine teeth; inner side of femur and inner side of hand and base of fingers granulated. Body and appendages with simple hairs. Abdomen wider than cephalothorax, widest behind the middle, not very long; hind legs long, reaching much behind the abdomen, other legs a little longer than usual. California, Dr. Cooper Curtice.

Olpium, Koch.

This genus is related to *Atemnus*, but has distinct eyes. It has not been recorded from U. S. A species from the District of Columbia may be called

Olpium rufulum, nov. sp.

Length, 2.5 mm. Colour, cephalothorax and palpi red, dorsal scutæ yellowish, legs white, venter yellowish. Palpi slightly longer than the body, second joint with a small obtuse projection behind; third joint (femur) pedicellate, about as long as cephalothorax, nearly cylindrical; fourth joint shorter, long pedicellate, both sides convex, inner side more convex toward base; hand pedicellate, nearly as long as fourth joint, not very broad, tapering slightly toward base of fingers; fingers curved, as long as hand; femur and part of hand finely granulate. Cephalothorax smooth, one and one-half times as long as broad, sides nearly parallel, slightly contracted in front of eyes, anterior margin a little convex; eyes close together, anterior eye about its diameter from anterior margin; mandibles not one-half the length of cephalothorax, apophysis slender. Abodmen about one and three-fourths the length of cephalothorax, not much wider, widest in middle; fourth pair of legs about reaching end of abdomen. Body and appendages with long simple hairs.

Under a large stone, Washington, D. C., March.

ADDITIONS TO THE CANADIAN LIST OF MICRO-LEPIDOPTERA.

BY J. ALSTON MOFFAT, LONDON, ONT.

As I was in the habit of sending to the authorities, for determination, only such as I had in duplicate, thereby avoiding the inconvenience of returning them, and retaining single specimens of a kind as a reminder of what to look for, and in most cases where to look for them, I found that in Micros single specimens accumulated rapidly. Having changed my location, I wished to finish up with the old material and begin anew. So as a means toward that end, I sent to Prof. C. H. Fernald 80 specimens that I had been unable to identify, with the understanding that he was to retain such of them as he desired. I regret that there seems to have been so little of value to him amongst them, as evidenced by the few that he did retain, to reward him for the time, trouble and thought that he must have expended on them, which is mildly disclosed in the remark appended to the list of names that he sent to me, "They are an interesting but difficult lot."

As was to be expected in such an accumulation, some turned out to be variations of old forms, others merely better specimens of some already known by name, whilst others were so poor as to render them unfit for determination; and some proved to be partially or wholly unknown to him. After discarding all pronounced too poor to determine, and placing in position those already known, we have the following 30 names added to our list, and their representatives to the Society's collection (excepting one):—

Botis oscitalis, Grote.
" *mancalis*, Led.
Hydrocampa proprialis, Fern.
Lipocosma fulginosalis, Fern.
Homophysa glaphyralis, Guen.
Toripalpus lunulalis, Hulst.
Acrobasis palliolella, Ragonot.
Ambesa walsinghami, Rag.
Euzophera semifuneralis, Walk.
Canarsia hammondi, Riley.
Peoria hæmatica, Zell.

Teras effractana, Frol.
" *hastiana*, Linn.
Lophoderus afflictanus, Wlsm.
Idiographis inopiana, Haw.
Eccopsis atrodentana, Fern.
" *malana*, Fern.
Sericoris .
Pædisca sm.
" *abbreviata* sm.
" *solicitana*, Walk.
Semasia ferruginana, n.
" *argutana*, Clem.
Proteoteras æsculana, Riley.
Phoxopteris subæquana, Zell.
Mellisopus latiferreana, Wlsm.
Dichrorampha incanana, Clem.
Cryptolochia querciella.
Gelechia purpureofusca, Walk.
" *inscripta*, Wlsm.

Then there are besides, one species of *Lophoderus* undetermined; three *Eccopsis*, three *Semasias*, two *Phycids*, three *Pædiscas*, and one *Penthina*, with eleven where the genera was uncertain or unknown.

Amongst the old names received is *Sericoris coruscana* and *constellatana*. *Coruscana* is in the Society's printed list; *constellatana* was first published as Canadian, so far as I know, in Mr. H. S. Saunders's list of captures at electric light in 1886. CAN. ENT., Vol. XIX., No. 2. It is a common and abundant species wherever I have collected, in its season, and tolerably constant, varying slightly in depth of shading. I have seen both names in collections when I have thought it looked like two names for one species. I had a specimen that differed somewhat from the ordinary in the markings; I put it in the box, and that is how I got the name at this time. Prof. Fernald detected two specimens of *coruscana* in this lot. It is distinctly different from the other and must have been very rare where I have collected, as it was wholly unknown to me; so that it seems extremely probable that the name on the Society's list should have been *constellatana*, instead of *coruscana*, and Canadian collectors would do well to take note of it.

NEW NORTH AMERICAN HOMOPTERA.—III.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

Lamenia Californica, n. sp.

Form and size of *L. vulgaris*. Black, shining, densely pruinose; head, pectoral pieces, and legs fulvous. Length, 4 mm.

Front but little wider across the middle than next the vertex. Head fulvous, tinged with brown on the vertex, apex of the clypeus, margins of the cheeks, and on the front each side of the central carina. Eyes dark brown. Pronotum fulvous, more or less embrowned on the disc; propleura, base of the intermediate femora and the claws dusky or blackish. Elytra as in *vulgaris*, blackish with a row of fine white lines on the transverse nervures at the base of the apical areoles. Plates of the male concave on their inner edges, touching at base and apex only.

This species is very near our eastern *vulgaris* from which it may be distinguished by its fulvous head, pronotum, and pectus, and the form of the plates of the male. In *vulgaris* these are slightly retreating on their inner margins at base, and near the middle exhibit a distinct re-entrant angle.

Los Angeles, California. Described from six examples, all males, received from Mr. D. W. Coquillett. (Nos. 642 and 643.)

Cicadula punctifrons var. *americana*, n. var.

This variety differs from the typical form as follows: Front deeper brown, scutellum with a black spot within the basal angles mostly covered by the pronotum which is there discoloured or marked with a brown cloud; two outer areoles on the clavus and the three inner on the corium blackish, appearing as five oblique blackish vittæ; apical areoles infuscated; nervures of the wings deep fuscous. Other markings and the genital characters as in the parent form.

The apparently constant differences between this and the typical form seem to call for a varietal name, but it could hardly be considered a distinct species. About Buffalo it occurs in great numbers on low willow bushes from June to August. I have taken one example that does not differ from typical European specimens in my collection. It occurred on osiers in company with the variety July 12th, 1889, but does not seem to be common.

Athysanus parallelus, n. sp.

Closely allied to *A. striola*, Fall.; larger and stouter, vertex shorter;

onotum shorter, its hind edge nearly straight. Colour and markings about as in that species. Length, 6 mm.

Head broad and short; vertex short, fore and hind margins parallel, but feebly arquated, width between the eyes three times the length, disc obscurely longitudinally rugose; face coarsely punctured; front moderately convex, its length and breadth subequal; clypeus oblong, sides straight, at apex slightly [illegible] feebly convex; loræ broad, rounded; outer edges of [illegible] rcely angled below the eyes, apically margining the loræ and ar[illegible] e tip of the clypeus. Pronotum as long as the scutellum, broad[illegible] rior margin calloused, behind which is an arquated impressed line, l[illegible] dge feebly concave or almost straight. Elytra usually subhyaline, s[illegible] imes more or less infuscated toward the inner margin, nervures distinct.

Genital characters. Male: Valve [illegible] y longer than the last ventral segment, broad, its apex rounded; p[illegible] broad, nearly square across their apex, outer angles rounded, inner edges contiguous nearly to their apex, a little shorter than the valve. Female: ultimate ventral segment a little longer than the penultimate, apical margin nearly straight, with a broad subtriangular central notch, not reaching the middle of the segment, extreme outer corners oblique; pygofers as in *striola*.

Colour yellow, pale on the face, pectus, legs, and disc of the pronotum. Front black, apex, median line and about six arcs on each side yellow; temples black marked with a yellow spot. Eyes, second joint of the antennæ, sutures of the face, median line of the clypeus, and front of the vertex black; ocelli fulvous, connected by a yellow band; posterior disc of the pronotum sometimes obscured. Elytra pale yellowish, inner and apical areoles sometimes smoky, nervures pale. Wings whitish hyaline, sometimes smoky toward their tips, nervures concolorous. Abdomen black; connexivum broadly, the genital and penultimate, and the margins of the ultimate segments, and sometimes the sides of the venter, yellow; sheath of the ovipositor black. In dark examples the outer surfaces of the femora are trilineate with black, and there is a black line on the edge of the anterior and intermediate tibiæ; tips of the tibiæ and tarsal joints embrowned.

Described from one male and seven female examples, all taken near South Falls, on the Muskoka River, Ont., about the first of August. This is the large form of *A. striola* mentioned in my list of Muskoka

Hemiptera, CAN. ENT. XXI., p 11, 1889. But a comparison of the genital characters with a series of *striola* received from Europe shows it to be a well marked species.

The true *striola* is common about Buffalo from July to September on swampy meadows and pasture lands.

Goniagnathus Palmeri, n. sp.

Form of *Pediopsis insignis;* short and broad, punctured, colour uniform deep shining black, tarsi and apical nervure of the elytra rufo-piceous. Length, 4 mm.

Head a little wider than the pronotum, closely punctured; vertex short, very little longer at the middle than next the eye, apex very obtusely angled, passage to the front well rounded; ocelli placed nearly half way from the eye to the apex of the forehead; front convex about one-sixth longer than wide, sides pretty regularly arquated, suddenly contracted at the apex, disc each side with a large smooth area crossed by about eight irregular rows of punctures; clypeus narrowed from its rounded base, (its apex?) loræ broad; cheeks broad, prominently angled a little below the eyes; antennæ small, incerted beneath a feeble oblique ledge. Pronotum long, almost semicircular in outline, latero-posterior margins long, hind margin moderately concave; surface coarsely punctured, irregularly so on the disc, anterior submargin with an interrupted transverse impunctured band across its whole width; narrow hind margin impunctured. Scutellum acute at apex; anterior field coarsely punctured, disc with a finely punctured area each side of the middle; posterior field transversely wrinkled, with a few scattering coarse punctures. Elytra but little longer than the abdomen, oblique at tip, thick and coreaceous, smooth; all the areoles circumscribed by a single row of coarse punctures; apical areoles five, short, subequal; antiapicals three. Inner edge of the posterior femora somewhat expanded apically in a small rounded lobe; basal joint of the hind tarsi thickened. Abdomen stout, last ventral segment of the female longer than the preceding, its hind edge very feebly advanced in the middle; pygofers short, obtusely subtriangular in form, slightly exceeded by the ovipositor.

Colour a uniform deep shining black; apical nervure of the elytra, tarsi, base of the eyes beneath, and the antennal setæ, rufo-piceous.

Desc n a single female example taken at Mt. Balsam, N. C., Aug. 1st, by my friend Mr. W. J. Palmer, jr., of this city, to whom I take pleasure in dedicating this singularly neat and elegant little species. This is certainly a notable addition to the homopterous fauna of this country. It is a remarkably trim compactly built little creature, mimicking very closely the genus hich it differs, however, by all the characters separating the Jassidæ proper. In its intensely black colour it has f ır Jassid fauna. In mounting this specimen the apex of its clypei unfortunately covered so its characters cannot be given.

DESCRIPTIONS OF SOME BU[T]RFLY LARVÆ FROM YOSEMI[TE].

BY HARRISON G. DYA EMITE, CAL.

Limenitis lorquinii, Boisd.

Egg.—Nearly spherical, the base flat; covered with elevated reticulations from the intersections of which arise short spines. The depressions between the reticulations are rounded. Colour pale green with a silvery lustre. Diameter .9 mm. Laid singly at the extreme tip of a leaf on the upper surface.

First larval stage.—Head rounded, brown, not shiny; ocelli and jaws black; a few minute hairs arising from yellowish elevated bases; width .6 mm. Body slightly enlarged at joint 12; feet normal. Colour yellowish, with rows of short conical tubercles, which are largest dorsally on joints 3, 4, 6 and 12; some very short and minute hairs. The larva builds out a long perch in continuation of the mid-rib of the leaf on which it rests. It collects a little bundle of bits of leaf, etc., at the base of this perch.

Second stage.—Head rounded, brown, with two paler lines in front converging toward the vertex. It is roughly tuberculate, the tubercles yellowish. Width .9 mm. Body densely tuberculate, each tubercle with several points, beside many minute granulations. General colour dark brown, with a broad, dull ochre, dorsal patch, which widens on joints 3–5 and 8–10. The larva rests on its perch as in the first stage.

Third stage.—Head bilobed, bulging in front, very rough and tuberculated, but the tubercles are not large. Colour nearly black, the clypeus and tubercles paler, the latter tipped with yellowish on the sides

of the head. Width 1.3 mm. Body rough and tuberculated, a pair of short subdorsal tuberculated processes on each joint except joint 2, those on joints 3, 12 and 13 the largest, those on joints 4, 6 and 11 next in size, the others all smaller; other similar smaller tubercles in a double dorsal line and two lateral lines, besides numerous small granulations. Colour black with a dorsal white patch on joints 8–10, reaching down the sides on joint 9. All the tubercles and granulations are dull yellowish, more especially on joints 2–4. The larva builds no perch in this stage.

Fourth stage.—Head as before, densely tuberculate, the tubercles larger laterally and especially so at the vertex. Colour blackish-brown, darker centrally, the tubercles pale. Width 1.8 mm. On the body are a series of round wart-like prominences covered with tubercles, the subdorsal ones on joint 3 produced into a pair of horns 1 mm. long, while those on joints 4, 11, 12 and 13 are larger than the others. Body densely tuberculate, black with a dorsal white patch as before. All the tubercles are pale brown. Some dorsal cream coloured shades on joints 3 and 4 and a black dorsal dot on joints 8 and 9 each. Indications of a white substigmatal band, especially on joints 11–13.

Fifth stage.—Head bilobed, the apices produced, rough and tuberculated as if covered with warts, higher than wide and depressed along the median suture. Colour dull olive-brown, the excresence paler; ocelli black; mouth dark. Width 2.8 mm. The body is enlarged dorsally at joints 3, 4 and 6; on joint 3 is a pair of subdorsal horns, roughly tuberculated, 2 mm. long. On joints 4, 6, 11, 12 and 13 are small subdorsal tubercles, the largest on joint 13, and close together. A number of small, round, smooth, elevated bluish dots, most conspicuous dorsally on joints 5–7 and 11–13. General colour olive-brown, shading into pale pinkish on joints 2–4, but still partly mottled with the ground colour. On the hump on joint 6 it is pale olive-yellow, except in a dorsal band where the ground colour prevails. A large patch, nearly white on joints 8–10 dorsally, but on joint 8 posteriorly and joint 9 laterally, it contains a few streaks of the ground colour. An irregular, broad, white, substigmatal band on joints 5–13. Spiracles black, pale centrally and encircled by white. The processes on joint 3 and tubercles on joint 13 are blackish-brown; venter mottled with whitish with a medio-ventral nearly white line.

Anal feet elevated in repose and the body humped, the head turned to one side. The larva usually rests on the stems of its food-plant.

Chrysalis.—Eye cases prominent, pointed, thorax keeled; wing cases very large, projecting; on the anterior part of the abdomen dorsally, is a very large circular disk-like projection, its sides somewhat creased. Abdomen tapering, the last segments rounded. Cremaster large, flat, fastened by its numerous hooks in the mat of silk spun by the larva and from which the pupa i ıg cases and abdominal hump subtranslucent dark olive l purplish, mottled with white; abdomen nearly all sordid v l with gray and black dorsally, laterally and in a double broad v and. The terminal segments and cremaster are entirely black. ı 25 mm.; thickness through thorax 7 mm.; height of abdominal ection 3 mm.; greatest width through wing cases 8 mm.

Food-plants. — Willow *(Salix)* ılar *(Populus)*, choke-cherry *(Prunus demissa)*.

The second brood of larvæ probably ibernate in the second stage in the manner usual in *Limenitis*.

ENTOMOLOGICAL FIELD DAY.*

July 4th was a great field day for the entomologists, it having been arranged to meet at Jamesburg, N. J. The societies represented were the Entomological Section of the Academy of Natural Sciences of Philadelphia, the Entomological Society of Philadelphia, the Feldman Collecting Social of Philadelphia, the Brooklyn Entomological Society and the Newark Entomological Society. About forty members were present, among whom were Dr. Henry Skinner, Curator of the Entomological Society of Philadelphia and editor of the Entomological News; Professor J. B. Smith, of New Brunswick; Isaac C. Martindale, of Camden; James Johnson, of Frankford; William J. Fox, Assistant Librarian of the Academy of Natural Sciences; C. W. Johnson, Curator of the Wagner Institute; Dr. Castle, Messrs. Liebeck, Neutze, E. Wenzel, H. Wenzel, Schmitz, Trescher, Hoyer, Bruner, Philip Nell and Philip Laurent, of Philadelphia, and Messrs. Machesney, Angell, Loeffler, Angelman, Sherman, Thompson, Ottolengin, Leng, Merkel, Roberts, Pearsall, Davis, Baier, Hess, Dietz and Sieb, of Newark, New York and Brooklyn.

*From the Philadelphia Public Ledger.

It was feared that the hail storm of the previous evening would somewhat interfere with the pleasures of the day, but the bright sunshine of the early morning brought sunshine into the hearts of the ardent collectors, for Jamesburg is well known to be a favourite collecting ground. The arrangements for the occasion were made by Prof. J. B. Smith, State Entomologist for New Jersey. The party were met at the Jamesburg Station by the gentleman having charge of the extensive cranberry interests near the town, and by conveyances were taken about a mile to a beautiful grove, bordering cranberry meadows, where, after a photographer had secured a picture of the entire party, the day was spent in collecting, ample lunch having been provided. The locality proved to be such that all the divisions of entomological study could be enjoyed. Philip Nell gave his whole attention to Micro-lepidoptera, C. W. Johnson collected the Diptera, W. J. Fox looked after Hymenoptera, a few collected in all the orders, quite a number looked after butterflies and moths (Lepidoptera) exclusively, while, perhaps, the greater portion collected the Coleoptera. Isaac C. Martindale succeeded in making the largest collection of the day of butterflies and moths, as well as a large number of dragon flies (Neuroptera), which seemed to be quite abundant. No complete list of all the collection has yet been made, but the following butterflies were taken:—*Papilio troilus*, *Papilio philenor*, *Colias philodice* and *alba*, *Pieris rapæ*, *Danais archippus*, *Melitœa tharos*, *Argynnis idalia*, *cybele* and *myrina*, *Hypophleas Americana*, *Lycæna comyntas*, *Thecla calanus* and *titus*, *Neonympha canthus* and *eurytis*, *Eudamus tityrus* and *bathyllus*, *Satyrus alope*, variety *maritima*, *Pamphila massasoit*, *manataaqua*, *verna*, *pontiac* and *metacomet*, which may be considered as a remarkably good catch for one day in one locality. The specimens were in fine condition, and some of them of rare occurrence. The best catch by the coleopterists was the *Cicindela lepida*, a beetle heretofore known only from the seacoast and the vicinity of the salt licks of Illinois.

The State of New Jersey has long been regarded as a good collecting ground for the naturalist in whatever department his studies inclined, and the finding now and then of these rare species in unlooked-for localities adds to her well-known reputation. Professor Smith has given much attention to the insects found to be injurious to the agricultural interests, and has greatly aided the farmer in ridding the farm and the growing crops of destructive things. The cranberry culture has received his

special a[illegible], and his knowledge of entomology has been of great service to [illegible]erry growers. The bogs near Jamesburg are looked upon as being the finest in the State, and the prospect this year is very favourable for a good crop. The berries are just now forming, the inflorescence having been in great profusion. Mr. Martindale identified all the plants that were collected, he having been engaged in botanical study for more than thirty years, and [illegible] with all the species growing in the State. He stated that [illegible]y crossing New Jersey diagonally, from Sandy Hook on [illegible]ear the city of Salem on the Delaware river side, in width abo[illegible]ty miles, known as the pine barren regions, was the best botanic[illegible]ound to be found east of the Alleghenies. Many entomologists [illegible]ot heretofore given sufficient attention to botanical study, but it is now well known that many species of insects feed exclusively on certain pla[illegible]ts, and a knowledge of these aids much in the determination of the collector's gatherings.

The Geological Survey of New Jersey, so long in charge of the late Professor Cook, has already published catalogues of the fauna and flora of the State, but there yet remains much desirable work to be done by the careful collector. The late Dr. Joseph Leidy, of Philadelphia, regarded the swamps of New Jersey as the best collecting ground east of the Mississippi Valley, and during the preparation of his memorable work on the Fresh Water Rhizopods made many and frequent visits thither, and thereby greatly enlarged our knowledge of species. The late Chas. F. Parker, of Camden, in company with Mr. Martindale and others, explored all that part of the State lying south of Trenton for botanical specimens. Mr. Martindale has collected the marine flora (sea mosses), and already published the results of his years of study in that department. Mr. Calvert, of Philadelphia, has completed a list of all the dragon flies known to this section. Dr. Henry Skinner has published a list of the butterflies that have been found in the vicinity of Philadelphia. All these greatly aid the student of natural history, and the annual field gatherings of the active entomologists are doing a good work in fostering a more social feeling among the many persons engaged in the study of insect life. No special arrangements were determined upon for another year, but it is expected that the annual gatherings will be continued, and all persons interested are privileged to attend. It was much regretted that Dr. Horn, the eminent entomologist of Philadelphia, was prevented by previous engagements from being with the party.

ENTOMOLOGICAL AND OTHER MEETINGS AT WASHINGTON.

The annual programme of the American Association for the Advancement of Science has just been issued. For a fortnight continuously meetings of great scientific interest will be held in Washington. In the whole of America there is no place which can compare with the American capital as a suitable place for such meetings. Not only is it the social and political centre of the Union, but here also are the headquarters of the various government scientific departments. To naturalists objects of great attraction will be the Smithsonian Institution, the National Museum, the Aquarium, the Botanical Gardens, National Zoological Gardens, and many other places of general interest. Several other scientific bodies have arranged to hold their meetings previous to the meetings of the American Association. The American Microscopical Society, Aug. 11–12. The Association of American Agricultural Colleges and Experiment Stations will meet Aug. 12 in the Law Lecture Room of Columbia University. On Aug. 13th the Association of Official Agricultural Chemists will begin its sessions, and a conference of American Chemists will be held on the 17th or 18th. On Monday, 17th, the Society for the Promotion of Agricultural Science will hold its first meeting, and also on the same day the Association of Economic Entomologists, of which our own Vice-President, Mr. James Fletcher, of Ottawa, is the presiding officer for this year. The Entomological Club of the American Association will meet on Aug. 19th. A joint circular has been issued by Mr. Fletcher and Prof. Osborn, President of the Entomological Club, urging entomologists to attend the meetings, and suggesting that papers referring especially to economic entomology might, for convenience, be best presented before the Association, while notes, items, discoveries of scientific interest, etc., might be referred to the Club, and authors are requested to send in beforehand titles of their papers to the proper secretaries, viz.:—

Mr. L. O. Howard, Secretary Association of Economic Entomologists, Washington, D.C.

Dr. C. M. Weed, Secretary Entomological Club, A.A.A.S., Hanover, New Hampshire.

This arrangement, we feel sure, will tend to make both of these meetings more successful, and will allow Entomologists attending to be present at all the sessions of both organizations.

the Entomological and Botanical Clubs of the American Associ[illegible] be held throughout the week.

On [illegible] whole the coming meeting of the American Association at Washington promises to be one of the most profitable and enjoyable of any ever held under the auspices of that most successful body.

C[illegible]NCE.

THOUGHTS O[illegible]PECIES.

Sir,—In considering the value of [illegible]tructure of genitalia in determining species, we come in direct [illegible]sion with the old unsettled question, "What constitutes a species?" I believe it to be a simple one, when we remember that there are two ways of using the term, the natural and the artificial. All are agreed that there is no such a thing as genera in nature, and I am fully convinced that there is such a thing as species in nature, which is satisfactorily demonstrated by cross breeding; and that the artificial method of defining species is merely a matter of individual opinion, as to how much difference should be considered enough to make a species. Does the fact stated by Prof. Smith, that "in an entire genus all the species will be practically alike," prove that the character has failed? May it not rather go to show that genus to be composed of just so many artificial species, of one natural species, which I am quite satisfied may often be the case, and, therefore, be a valuable proof of its success?

There are no two opinions of the advantage to be obtained from a reliable test of species. Prof. Smith expresses confidence in the genitalia up to a certain point; given his experience, we might have the same. One of his published investigations convinced me that there must be a great deal in it.

In Entomologica Americana for August, 1890, dealing with the *Scopelosomas*, he says, "*Moffatiana* is closely allied in colour and maculation to *Grœfiana*, so closely, indeed, that for a long time they were considered identical. * * * The genitalia of *Moffatiana* are of an entirely different type from the other species of the group. * * * This strong difference in species otherwise so nearly allied is remarkable." As I know the history of how they came to be separated, I will give it as confirmatory evidence to the value of that method.

In that famous entomological year, 1877, I took *Scopelosomas* for the first time; they were in great abundance. From the latter part of September to the first day of December I took about 800 moths, mostly *Scopelosoma* and *Lithophane*, the bulk of the *Scops.* being of that form now known as *Moffatiana*. I had noticed a difference in the depth of shading in the yellow ones, but thought it the result of age and exposure.

In November I visited Mr. Grote in Buffalo, taking with me representatives of my recent captures, and received from him over a dozen names of *Scops.* and *Liths.*, and amongst them *S. Græfiana*. In following years I observed that the yellowish form was just as fresh as the reddish one, and that in some localities one would greatly outnumber the other, and I began to suspect that we might have in these forms different moths. About this time Roland Thaxter, who is now, I understand, entitled to the prefix of Dr., opened communication with me, with a view to exchange; to him I expressed my suspicion, and sent to him an example of the light form as being least abundant with me, and received the reply, that he saw no difference in it from those he took. I then sent him the reddish form; he expressed delight, never having seen the same before, and enquired if Mr. Grote had seen it. I told him that I had got the name from just such specimens.

I supplied him with a good series, and he went into communication with Mr. Grote about it, and it seems with some difficulty succeeded in persuading Mr. Grote that it was deserving of a separate name. And now Prof. Smith, by the examination of the genitalia, finds them widely apart. I, by observing their habits, had suspected this might be the case, but could not prove it, whilst from appearance alone Mr. Grote had failed even to suspect it.

As resemblance is not always proof that they are one, so the lack of it is not a demonstration that they are separate. In the early part of 1890 I had an opportunity of examining an extensive series of *Lithophanes* in the collection of Capt. Geddes, Toronto. I could arrange in line 30 or 40 *Disposita*, *Petulca*, *Ferrealis*, *Signosa*, *Bethunei*, in such a way as to make it appear impossible to tell where the separation should be made. What verdict would the genitalia give in this case? I would expect it to be in favour of their being artificial species of one natural species; yet it may not, but suppose it did? let no one think that I would favour the obliterating of a single name.

J. Alston Moffat.

BOOK NOTICE.

INSECTS AND INSECTICIDES, by Clarence M. Weed, Hanover, N. H., 1891.

Under the above caption Dr. Weed has published a small volume of 281 pages, well printed and copiously illustrated, which will be found most useful by those for whom it is prepared—the farmer, the fruit grower, the floriculturist, and the housekeeper. The work consists of an introduction and six parts. The introduction gives a concise account of the transformations of insects, which are illustrated by the life history of *Papilio asterias*, the Celery Caterpillar, for those which have a complete metamorphosis, and the Chinch Bug for those which pass through incomplete transformations. The differences between biting and sucking insects are explained, and the natural enemies of injurious insects are treated of. There is then a summary of the different insecticides, and the best methods of applying them. The introduction closes with short instructions for collecting and preserving insects.

Part I. treats of Insects Affecting the Larger Fruits—apple, plum, pear, cherry, peach.

Part II.—Insects Affecting Small Fruits—strawberry, currants, gooseberries, raspberry, blackberry and grape.

Part III.—Insects Affecting Shade trees, the Rose and House Flowers.

(Parts 1-3 of Dr. Weed's work have appeared previously in a small edition issued by the Columbus (Ohio) Horticultural Society.)

Part IV.—Insects Affecting Vegetables—tomatoes, potatoes, celery, squash, cucumber, bean, pea, cabbage, onion, asparagus and rhubarb.

Part V.—Insects Affecting Cereals and Forage Crops—Indian corn, wheat, clover, grass.

Part VI.—Insect Pests of Domestic Animals and the Household.

On the whole this is a very useful and attractive volume, well arranged, easy of reference, and well illustrated. The accuracy and quality of Dr. Weed's scientific work are now too well known to need any comment, further than to say that this his last publication is up to his usual excellent standard.

J. F.

Mailed August 6th.

The Canadian Entomologist.

VOL. XXIII. LONDON, SEPTEMBER, 1891. No. 9.

NOTES ON COLEOPTERA.—No. 8.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Panagæus crucigerus, Say.—The living beauty of this beetle is but feebly represented by the dull and faded examples usually seen in collections. Its bright sparkling colours lose their brilliancy onward after life ceases, for which no restorative has yet been discovered. It is not infrequent along the New Jersey coast, occurring sometimes in abundance. The mature insects may be found on Brigantine Beach from the middle of July onward. They are in their greatest abundance about the first of September, at which time they seem to be disclosed. The eggs of many *Carabidæ* are deposited in July and August, and from such, imagoes are produced during the same months of the succeeding year. Individuals of these same and other species hibernate and oviposit in the spring, but their offspring are usually not perfected till the next year. *Panagæus crucigerus*, however, at least on the coast, seems to oviposit in the spring, probably during April, and to disclose the same year about the time mentioned, as appears from observations repeatedly made, one of which is given. Sandy depressions are seen covered in summer two or three inches in thickness with sea trash, below which the ground is damp from capillary attraction, as they are only a few inches above the ordinary summer tides. These are the beds of tidal streams, which, during the winter and spring till near April, are constantly covered with salt water from ocean or bay, many of them being formed during that time, and previously existing ones filled up. On the first of September, on overturning some of the weeds deposited on one of such places, several examples of *P. crucigerus*, too immature for use, were taken, which evidently had been bred where they were found. As this bed had been formed during the winter, of course the eggs from which these insects were derived must have been deposited after March. It was physically impossible for the larvæ to have reached there from other places, because for a long distance around there was nothing but dry and burning sand.

rapid development it may be stated that these places multitudes of small crustacea and other minute forms that the food supply of the larvæ is most ample, pro- growth and earlier maturity than occurs in the case of bountifully supplied. A couple of weeks afterwards the rest was fully investigated and over fifty well chitinized examples named, while many other were still immature.

This species was described from a specimen cast alive by the waves on the sea beach of Seniputxen, Maryland, the last of September, and it is now recorded as occurring on the sea coast of New York, New Jersey and Florida; also Lake Pontchartrain, Louisiana.

Amara fulvipes, Putz.—This beetle was unknown here till recently, when Mr. Klages took a large number in a pasture field, where there were cattle, late in the year (October)—many of them paired. I took it in this city since at electric lights in June, and once in a field in a hilly place later. It probably inhabits the hilly districts along the foot of the Alleghanies. It is decidedly a fine species, belonging among the large elongate forms *(Lirus)*. It does not appear to be generally known, or at least is not plentiful enough to appear on an exchange list, while none have been received for identification. In the last two catalogues of European Coleoptera there is an *Amara (Triæna) fulvipes*, Serv., and if my investigations are correct Putzey's species must be renamed.

Bradycellus cognatus, Gyll.—*Tachycellus* appears for the first time in a general European catalogue, in edition IV., just published (May, 1891), and under it is this species. While the first three joints of the antennæ are not really pubescent like those which follow, yet they are armed so thickly with long thick hairs that its removal from *Bradycellus* seems doubtfully justifiable. This species is native in Europe and in Asia, as well as in North America.

Quedius fulgidus, Er.—This beetle has been taken in a more northern latitude than is recorded of any other species. It was found during the voyage of the Alert and Discovery towards the North Pole, 1875–76, at Discovery Bay, in Grant Land, North America, in about lat. 82 °. (Linn., Jour. Zoology, XVI., 107.) This beetle is remarkable otherwise for the power it has of adapting itself to a variety of climates, being found likewise in very warm countries, as Asia Minor, Barbary, Java, Tasmania, Australia, etc., in all of which it seems to be native. This world-wide distribution has produced considerable variation, especially in its colora-

tion, and it is not well agreed among eminent coleopterists whether there should be one species or two. The form found in Grant Land is stated to have been the common black British form, *mesomelinus*, Marsh.

Tanarthrus salicola, Lec.—This interesting little Anthicide was described from the salt marshes of the Rio Colorado, where it is said to have the habits and activity of a Cicindelide. I saw an example taken by an amateur entomological friend on a salt marsh near Lincoln, Nebraska, which shows the species to be also an inhabitant of the alkaline salt marshes west of the Rocky Mountains.

Leptinus testaceus, Müll.; *Caucasicus*, Motsch.; *Americanus*, Lec.—This curious beetle, which is blind, is known to be native in Europe and Western Asia, as well as in North America. Its consideration here is chiefly intended to present at one view what is known of its habits and what has been written about it, with the view to ascertain more nearly its mode of life. The chief bibliographical references in American literature are :—

1. Proc. Acad. Nat. Sci., Phil., 1866, 367. Described by Dr. Leconte, under the name *Americanus*, from examples found by Dr. Brendel at Keokuk, Iowa, under a log, in a mouse nest.

2. Classification of the Coleopt. of N. A., 1883, 77. "Lives with various small rodents and insectivora, either on their bodies or in the material of their nests, but whether as true parasites or merely as guests has not been determined."

3. Proc. Ent. Soc., Washington, I., 16, 1884. "Known to be parasitic only in the imago state."—*Schwarz*.

4. Insect Life, I., 200. Prof. C. V. Riley states that the larvæ and imagoes had been found around Washington in the nests of *Graphops*.

5. Scientif. Amer. Suppl., XXV., 10356, June 1888, and re-printed in Insect Life, I., 306. "It is known to be parasitic on mice, as it has been found upon them in Philadelphia by Dr. John A. Ryder, and I have taken it in the nests of a common field mouse near Washington."—*Riley*.

6. Proc. Ent. Soc., Wash., II., 2. "Parasitic on wood mice and on other small rodents."—*Schwarz*. Mr. H. Ulke has also taken this species. Prof. Jerome Schmitt, of St. Vincent College, Westmoreland Co., takes it comparatively frequently, and kindly permits the use of his notes. Nov. 3rd, 1890, one example was taken in a mouse nest under a log, the mouse having just fled; cold and snowing. Many nests of mice were examined by sifting during the winter, but no *Leptinus* were obtained

. 18, 1891, three examples were sifted from leaves
a ience, but not in company with mice. June, 27, under
in a lot of dry vegetable matter, possibly an abandoned
e of mice bees' nest, some 50 or 60 specimens were obtained. July
under circumstances similar to the last, about a dozen examples
re found. August 10th. a single example was found on Chestnut
ridge (one of the Alleghan one where no nest nor mouse
far nor near could be found. of Mr. Schmitt's collecting
shows that *Leptinus* may be taken at any season of the year. It also shows that it is not wholly dependent on mice or mice nests for its food, as of the five captures it only occurred once with a mouse. All previously recorded captures were made in the nests of this rodent, which has given rise to the expression: "*Parasitic in the nests of mice*," etc. The statement that *Leptinus* is parasitic on the bodies of mice is unsupported, except in one erroneous instance, from which all assertions of this kind have probably arisen. The statement in Insect Life cited, that it has been found on mice by Dr. John A. Ryder, proves, on being traced up, to be somewhat erroneous, and it is found, curiously enough, to have been a mole—and dead—on which it occurred, perhaps much in the way a *Cercyon unipunctatum*, a *Silpha*, *Choleva*, etc., might have been there.

That *Leptinus* is not a parasite seems to have been the opinion of some distinguished European authors, among them, Mr. A. Fauvel, who published a paper on the subject in 1863, in Annales. Ent. Soc., France, of that year, in which he states that this insect is found under dead leaves, in leaves in hollow logs, under logs, stones and roots, and thinks, with Fairmaire (cited), that the opinion that they are parasitic on or with rodents is erroneous; advancing the conjecture that they feed on small fungi, like most *Choleva*, *Agathidium*, *Oxypoda*, *Tachyporus*, etc., the decaying leaves and mosses of the nests of rodents often furnishing supplies of this small vegetation accounting for their presence there. If Mr. Fauvel is correct in this surmise, it would be only in line for them to resort occasionally to a carcass for food, if in its vicinity, as is the well-known habit of many insects which live on decaying matter and low forms of life, thus accounting for their presence on a dead mole, as found by Dr. Ryder. Whatever may be the nature of its food, from the foregoing it is evident it can and does live independent of animals, and that the proper term to apply to it in its relation to rodents would, perhaps, be frequently inquilinous. In Europe the distribution of *Leptinus* i Germany, France, Sweden, Caucasus; in America, that mentioned abo

But, were the country collected over by the mode employed by Professor Schmitt, without doubt it would be found to be a common and widely distributed species.

Agabus (Colymbetes) discolor, Harris, New England Farmer, 1828, 164.
A. (C.) phæopterus, Kirby, Faun. Bor. Am., 1837, p. 70, No. 102.
A. (C.) phæopterus, Kirby (Mann.), Bul. Nat., Ges. Mosc., 1853, 159.
A. discolor, || Lec., An. Lyc. Nat. Hist., New York, V., 204, 1852.
A. obliteratus, Lec., Smith, Cont. XI., 5, 1860.
A. (Gaurodytes) Lecontei, Horn, pro. *A. discolor*, || Lec., Tr. Am. Ent. Soc., IV., 417.

These forms have been heretofore united and disunited in a variety of ways, and what appears to be the true synonymy seems at present a little clouded.

Discolor, Harris, has in the Munich catalogue for a synonym *phæopterus*, Kirby, but the reading of the descriptions shows this to be an error.

A. phæopterus, Kirby, was described from examples taken in lat. 54°. A form determined by Mannerheim to be this species was taken in Alaska. *A. discolor*, || Lec., was described from California, and *obliteratus*, Lec., from Kansas.

In Dr. Leconte's List of North American Coleoptera, 1863, p. 17, these forms are tabulated thus:—*A obliteratus*, Lec. (*? phæopterus*, Kirby, *discolor*, || Lec.), which means that the last two are considered identical, and in case of the identity of *obliteratus* and *phæopterus* the latter would have the precedence.

That *discolor*, || Lec., and *obliteratus* are quite distinct has been satisfactorily shown by Mr. Crotch, l. c.; and it now remains to show the identity of *phæopterus*, Mann., and *discolor*, || Lec. In 1854, Dr. Leconte sent a large number of Pacific Coast species to Motschulsky for comparison with the types of the Russian authors, and in the autographic letter of Motschulsky, now in my possession, containing the results of his comparisons, dated Jan. 26th, 1855, is written of this species: "*Agabus discolor est d'apres*, Mannerheim, *Ag. phæopterus*, Kirby." This, therefore, would seem to settle the identity of *discolor* and *phæopterus*, Mann., which Mannerheim in some way came to regard as Kirby's species. Dr. Leconte, in his List, l. c., appears to have acceded to this. But when in Europe, in 1870, after an examination of Kirby's types, and giving a short description of the male and female, merely says of this and *A. bicolor*,

species are allied to *A. discolor*, Proc. Acad. Nat. ; 326. The foregoing discussion seems to warrant the nymy :—

discolor, Harris, Massachusetts, (seemingly unknown).

phæopterus, Kirby, British America ; lat., 54°.

A. Lecontei, Crotch: *discolor*, || Lec.: *phæopterus*, || Mann. California, San Francisco, nosa, on the Rio Grande, at 7,600 feet, (differs in b.. val and more parallel, *Leconte);* Alaska, Peninsula of Kenai, Island of Afognak.

A. obliteratus, Lec.; Kansas, Ft. Laramie, Lawrence ; Colorado, Leavenworth Valley at 10–1,1000 feet; Southern Colorado ; Northern New Mexico ; Wyoming, Lake Como.

A. bicolor, Kirby.—A single specimen was taken by the Richardson expedition at lat. 54°. It likewise occurred in Alaska on the peninsula of Kenai.—*Mannerheim.* While in Europe Dr. Leconte examined ♂ and ♀ types, giving brief descriptions of each (Proc. Acad., l. c.). This appears to be a good species and, with *phæopterus*, should have a place in our catalogues.

Phæopterus, *Lecontei*, and *bicolor* seem very close, and their separation by the various descriptions without the presence of examples could not prove very satisfactory.

CERURA SCOLOPENDRINA, Boisd.

I think I have satisfactorily identified this species. I captured a specimen at Yosemite, California, on June 5th, 1891, that bears out Boisduval's description. The specimen, however, is *Cerura aquilonaris*, Lintn., and these names will have to be considered as referring to the same species. I have also received a specimen from Mr. C. A. Wiley, of Miles City, Montana, so the species probably occurs from the Atlantic to the Pacific. The synonymy will stand as follows :—

CERURA SCOLOPENDRINA, Boisd.

1869—Boisduval, Lep. de la Cal., p. 86.

Aquilonaris, Lintn.

1877—Lintner, 30th Rept. N. Y. State Mus., p. 197.

1891—Thaxter, CAN. ENT., Vol. XXIII., p. 34.

It is unfortunate that the rule of priority will not allow us to retain Prof. Lintner's name for this species, since his characterization of it is so careful and exact as to render its recognition easy, which is not the case with Boisduval's description.

HARRISON G. DYAR.

DESCRIPTIONS OF SOME BUTTERFLY LARVÆ FROM YOSEMITE.—II.

BY HARRISON G. DYAR, YOSEMITE, CAL.

Junonia cœnia, Hubn.

Egg.—Spherical, a little flattened at the base, with about twelve vertical ribs running to the micropyle; colour, shining pale green; diameter, .5 mm.

First Stage.—Head rounded, black and shiny; width, .25 mm. Body sordid greenish, with long black hairs curving forward, arising from small lustrous tubercles. Feet concolorous with the body.

Second Stage.—Head bilobed, black and shiny, with a number of hairs; width, .5 mm.; body sordid purplish, almost black, with short black tubercles arranged as in the last stage, and bearing numerous short fine hairs. Cervical shield ochreous; anal plate black The tubercles on the cervical shield are black.

Third Stage.—Head bilobed, a conical tubercle at the apex of each lobe, shining black with yellow piliferous tubercles; width .95 mm. The body and the series of spined processes, which represent the tubercles of the preceding stage, are black, the former more reddish subventrally. The lateral tubercle on joint 2 is orange, as is also a smaller subventral one on joints 2, 3 and 4 each. As the stage advances a double dorsal and subventral row of white dots appears, and, later, the bases of the substigmatal spines (row 4), and the anal feet become orange tinted.

Fourth Stage.—Head bilobed, bulging laterally, a spined process at the apex of each lobe, pointing forward; colour black, very shiny, with many white conical setiferous granulations; labrum and bases of antennæ, whitish; width 1.8 mm. Body velvety black, the long-spined processes shiny blue-black, a short one above the spiracle on joint 2 and a longer one below it, beside a short stigmatal one on joints 3 and 4, orange. A

and stigmatal row of white dots, three or four on each all black, the abdominal ones tipped with reddish. The behind the head is orange tinted.

Fifth Stage.—Head bilobed, a short spined process from the vertex of each lobe; many conical granulations each bearing a hair. Colour, shining black in front, but lar posteriorly, and at the vertex; a fulvous patch covering the cly ulations fulvous or yellow, processes black; the labrum and bases o. e antennæ white; width 2.5 mm. Body velvety black, the long (1.5 mm.) and slender spined processes shiny blue-black, except rows 5, 6 and 7, which are orange, row 7 being pale. The rows are arranged as follows, and correspond to the arrangement of warts in the Arctiidæ (except *Halesidota*), except that the rows on each side of the dorsal line in Arctia (row 1) are here fused to form a single dorsal series:—

No processes on joint 2; a subdorsal and lateral series on joints 3 and 4; a dorsal (1), subdorsal (2), superstigmatal (3) and substigmatal (4) row on joints 5–12; two subdorsal ones on joint 13; two tubercles (5) and (6) above the bases of the legs, and four short ventral spines (7), on the legless segments. A geminate diffuse dorsal series of numerous minute yellow dots, like dust, in which appears later a double dorsal series of segmental dashes; a geminate stigmatal row of large yellow spots, the substigmatal ones almost forming a continuous line, with many minute dots like the dorsal series. The skin behind the head, spots at the bases of spines 3 and 4, and the abdominal legs, reddish-orange; thoracic feet black. Spiracles black, with a pale yellowish border.

Chrysalis.—Of usual shape in the sub-family and without any marked prominences. Eyes large; the depression between the thorax and abdomen slight. Thorax very slightly ridged dorsally, without points; a dorsal abdominal series of very slight points. Cremaster broad, flattened, its hooks fastened in a button of silk. Colour black, not shiny, dotted with white on the back, especially in a series of eight subdorsal white patches, the first of which (over the eyes), and the last two (on the middle and end of the abdomen respectively) are confluent over the dorsum. Length, 17 mm.; width, 6 mm.

ON SOME DESTRUCTIVE LOCUSTS OF NORTH AMERICA, TOGETHER WITH NOTES ON THE OCCURRENCES IN 1891.

BY LAWRENCE BRUNER, LINCOLN, NEBRASKA.

(Delivered before the Association of Economic Entomologists, at the Third Annual Meeting, August 17th, 1891.)

In introducing this subject it is my intention to speak shortly upon the various species of Locusts which have appeared in injurious numbers within the territorial limits to be designated with each species. Some of these species have covered a vast area of territory, and have caused extensive injury from time to time, while others have appeared over limited areas only, and have caused but slight injuries; but yet these have been sufficient to necessitate their mention amongst the destructive species of the country. Taking them altogether, we have exactly twelve destructive locusts within the territory designated.

Dissosteira longipennis.—Selecting the species as they occur to me, I will mention first the Long-winged Locust. During the early part of July reports came from the eastern and south-eastern portions of Colorado of locust depredations. The first of these was that trains had been stopped by grasshoppers getting on the rails of the Santa Fe Railroad, 100 miles or thereabouts east of Denver. Shortly after this, reports appeared in the newspapers of serious damage being done around the point where they were first mentioned as stopping trains. About this time other reports of depredations came in from North Dakota and Minnesota and other portions of the west and north-west. On the strength of these reports Prof. Riley instructed me to visit the localities, for the purpose of ascertaining the extent of country overrun, the actual and possible future injury which might result, and the exact identity of the species concerned. Being a Nebraska man, and looking out for first interests, I naturally went to Colorado, the nearest locality to my home from which reports had been received. I first visited Akron, Colorado, the nearest point on the Burlington and Missouri line to the region infested. There securing a team and driving to the south only about six miles, the advance guard of the enemy was encountered. Imagine my surprise at finding here an entirely new insect, as far as destructive locusts are concerned. There in Colorado, and in immense numbers, was the *Dissosteira longipennis*, an insect usually considered rare in collections, and one heretofore only known to occur

portions of the plains lying to the eastward of the Rocky
e States of Wyoming, Colorado and New Mexico. This
ertained from inquiry, covered an area of about 400 square
of territory in sufficient numbers to materially injure the grasses
on the ranges of the entire region—and amongst these grasses,
cies of *Bouteloua*, or Gramma grasses, and the Buffalo grass,
ntoe dactyloides, st... st attacked, grains and other
cultivated plants not appea... cially attractive to it. In fact
very little or no injury was done by ... the cultivated crops growing
within the region infested. About the same time that I was investigating
this insect upon its northern line of injury, Profs. Snow and Popenoe
were studying the same insect upon the southern border of its range, and
they found practically the same food-habits there that I had noted in
the north, and, by enquiry, found that the insects had come into that country from the south last fall, and had laid their eggs over a large area.
This year when the eggs hatched, the young began to move from their
breeding centres in all directions, seeking open places and the edges of
ploughed fields, and following roadways. This trait of seeking open spots
this season is probably due to the habit of the insect of naturally living
on open ground where grasses are short and scattered. The present
year was very wet in this particular region and caused an undergrowth of
grasses, hence the desire to find the natural conditions under which the
insect lives. The young began moving and finding these open places,
there congregated. Having thus gathered together in large numbers, they
must feed, and they naturally swept the grasses clean around these spots;
so noticeable was this in certain spots where they had gathered about the
hills of a species of ant which raises mounds of small gravel and cuts
away the vegetation for some distance around them, they had enlarged
these areas, in some places for fully half an acre. This year Messrs. Snow
and Popenoe observed them flying southward with such ease, by reason
of their long wings, that they resembled birds.

Dissosteira obliterata, Thomas. Closely related to the above and very similar in appearance to it, is a second species of these large, long-winged locusts, which was found in injurious numbers along with *Camnula pellucida* in Idaho last year. It was quite common in the Wood River county lying north of Shoshone, and in the vicinity of Boise City, Idaho. One form of this species was described by Saussure as *Dissosteira spurcata* in his "Prodromus Œdipodorum". This is not the *Œdipoda oblitata* of Stoll.

Camnula pellucida.—This is the insect which has occasionally been very destructive in parts of California and Nevada. It has since spread eastward into Idaho, where it is very destructive the present season, covering an area of at least 1,300 square miles of territory. It also appears in great numbers, with several other species, in the Red River Valley of Minnesota, North Dakota and Manitoba. I also observed it abundantly in the Prickly Pear and Gallatin Valleys of Montana, near the mouth of the Yellowstone, in North Dakota, in portions of Wyoming, Colorado and the extreme western parts of Nebraska. It also occurs in the New England States and British America. This is a species which readily adapts itself to any new locality, being the most easily acclimated of any of our injurious locusts. When once established it is there to stay, and will require earnest attention from time to time in the future. In fact, I consider this locust, though not migratory, fully as destructive as the Rocky Mountain or true migratory locust, from the fact that it so soon becomes acclimated.

Acridium americanum.—This large, handsome locust is the species which occasionally devastates Yucatan, Central America and Mexico, and even reaches the United States in injurious numbers along our southern coasts. It has also been known in dangerous numbers as far northward as the Ohio River, and occurs sparingly as far north as the Northern States, but I imagine never reaches British America.

Dendrotettix longipennis.—"Post Oak Locust" of Texas. During the spring of 1887, while visiting Washington County, Texas, to investigate a local outbreak of an injurious locust, I heard of a species that was attacking the oaks of that particular region, and in some places entirely defoliating them. On my way from the region where I had been working, to the city of Brenham, we passed through the infested locality, and I obtained some of the insects in question, which were then in the larval stage. A careful examination proved the insect to be new and congeneric with a species heretofore collected only in the vicinity of St. Louis, Missouri, which also occurred only on oak. About a year later this species was described by Professor Riley under the above name. The insect occurs in two forms, long-winged and short-winged. The former flies with great ease and often leaves the trees in midday and alights in fields and other clearings—with the least disturbance it rises again and flies to the tops of the adjoining trees. The larvæ and pupæ are also exceedingly active, and run over the branches and trunks of trees with great

ggs are laid in the ground around the bases of the trees. e st fifty square miles of forest was completely defoliated ... these insects during that and the previous year.

noplus spretus.—The Rocky Mountain or Migratory Locust. the insect which is generally referred to as the destructive locust rth America, and has caused more injury during the past twenty years than any dozen of combined. It is this species which we most fear, on account of its r tory habits—so marked is this trait that swarms hatching on the Saska ewan have been traced to the Gulf of Mexico in one season. Its habits have been so frequently described that further mention is unnecessary. Suffice it to say that at the present time it is again decidedly on the increase along our northern boundary. During the present year reports of its injury were received from Minnesota, North Dakota and Manitoba, by the Department of Agriculture, and upon investigation I found these reports to be only too true. In Minnesota and Dakota the authorities, ably assisted by the efforts of settlers, have been carrying on a vigorous warfare with marked results, which will doubtless save their crops from devastation next season

Melanoplus atlanis, Riley. The Lesser Migratory Locust.

This locust, which frequently becomes very injurious on account of its excessive increase, is somewhat smaller than the Rocky Mountain species. It is also migratory in its habits, but to a much less degree than is *spretus*. In its distribution this insect is much more widely spread than the preceding—being a common one in almost all parts of our country from the Mexican boundary to the 53rd degee of north latitude, and even beyond in some parts of the country. It is the species which most frequently does the locust injury in the New England States, much of that in our Northern States, and some of that in the extreme north-west. It has also been known to become injurious even in the Middle and Southern States. In its distribution *atlanis* appears to be more partial to hilly or mountainous country, and especially is this noticeable in reference to its appearance in destructive numbers. It also seems to prefer wooded or mixed country to the open prairie or plains.

As would naturally be expected from its wide distribution, this particular locust presents some variation in its size, colour, and to some extent also, its structure. At any rate, there appear to be three well-marked forms of the species to be met with within the confines of North America

Melanoplus devastator, Scudd.

A third species of the genus *Melanoplus* is the one that occasionally appears in destructive numbers in portions of California and the adjoining States. It is about the same size as the *atlanis* just mentioned, and often does considerable injury to the crops of the regions where it occurs. Although this locust is know to inhabit almost the entire region lying to the west of the main divide of the Rocky Mountains, and to reach even beyond in Montana and Colorado, it has never, to my knowledge, been injurious except in Nevada, California, Arizona and Oregon. This species also occurs in two forms, viz., small and large, being the spring and fall broods as nearly as I have been able to decide from specimens in collections.

Melanoplus bivittatus, Say. The Two-striped Locust.

This is our common species of "native grasshopper" all over the country, and the one that so frequently becomes injurious to our gardens and about the edges of fields. It occurs from the Atlantic to the Pacific, and from the Gulf of Mexico to the Saskatchewan. Its increase in destructive numbers appears, however, to be confined chiefly to the regions lying between the Rocky Mountains and the Atlantic. This locust also appears to vary considerably in its size and colour. There are, however, two well-defined forms of it, the one receiving the name *bivittatus* and the other going by that of *femoratus*—the latter occuring only northward.

Melanoplus differentialis, Thos. The Differential Locust.

Next to the species just mentioned we frequently find a second species of our large native locusts appearing in destructive numbers. This latter species occurs in the Western and Middle States only, and is here very often known to become unduly numerous and destructive to both field and garden crops. It has been reported at different times to have been present in such numbers in portions of Illinois, Indiana, Missouri, Kansas, Iowa and Nebraska. A melanistic or black form of it is quite frequent in portions of Nebraska and Kansas; but otherwise it is quite permanent in its characters.

Melanoplus ponderosus, Scudd. The Ponderous Locust.

An insect very closely related to the preceding is that known to the entomologist by the above name. It is a native of several of our Southern States, and has on several occasions been the depredator of crops in portions of central Texas. As the name would imply, it is of robust form, and it has a somewhat similar appearance to *differentialis*.

emur-rubrum, DeG. The Red-thighed Locust.

t of destructive locusts is herewith presented the one that
e greatest geographical range of all of our species. It is
in all parts of the country from the Atlantic to the
m the Arctic circle to Central America. Its devastations,
perhaps not as vast as some of the preceding, have been more
uent and have occur than those of any other one.
Like the *bivittatus*, *differe* eral of our non-destructive
species, *femur-rubrum* is a frequent rather low places and rank
vegetation.

After giving these brief notes on the various species of locusts that have been known in the past to have been connected with the injuries from this class of insects within the country, it will not come amiss for me to say a few words about the subject for the present season, and to give my opinion as to the probable outlook for the coming year. Briefly, then, let me say that there have been received reports of locust injury from the following States:—Alabama, Mississippi, Texas, New Mexico, Arizona, California, Idaho, Colorado, Kansas, Nebraska, North Dakota, Minnesota, Iowa, Indiana, Ohio, Michigan and New York. In fact, there have been more separate reports received the present year than ever heretofore from this cause.

Now a word or two as to the different species of these destructive locusts that are responsible for the injuries of the present year. In California the *devastator* is present; the *Camnula pellucida* is known to be unduly common in Idaho, Minnesota, North Dakota and parts of the Rocky Mountain region; the Rocky Mountain or Migratory locust is the one that is responsible for most of the injury that has been reported from the Red River Valley of Minnesota and North Dakota as well as in Manitoba to the north of the international boundary; *Melanoplus differentialis* is the one that must receive much of the blame for Kansas and Nebraska injury; while in the States of Indiana and Ohio *femur-rubrum* and *bivittatus* are the guilty parties. *Melanoplus atlanis* is present in injurious numbers in the Red River Valley along with *bivittatus*, *spretus* and the *Camnula pellucida*. In Colorado and New Mexico for the first time *Dissosteira longipennis* has appeared as one of the injurious species of the country.

While all of these locusts, along with nearly every other species of the

group which are native to North America, are to be counted as injurious, the particular one that has been the dread of the whole country, and especially of the region lying between the Mississippi River and the Rocky Mountains, is the Migratory species, *Melanoplus spretus*. This insect is now on the increase in a limited area on our northern boundary and across the line in the province of Manitoba. By continuing the prompt and energetic efforts that are being carried out by the populace and State authorities of the States of Minnesota and North Dakota we can be assured of success only provided the Canadian Government will also see the advantage of co-operation at this time. This, let me state, is all the more necessary at this particular time, as all reports seem to indicate that at present this locust is not present in abnormal numbers in any other part of the country. A stamping out of the pest in this region might, therefore, give immunity from their further injury for many years to come.

Finally, let me urge on the inhabitants of all infested regions that a "stitch in time saves nine." In other words, we do not know what the climatic conditions may be a year hence, whether they will be such as to favour the hoppers or not, so we had best do the wise thing and stamp out the pest. This has been done time and again in the past, and the recent work in the north shows how very profitable is the warfare when carried on persistently. By the plowing under of the eggs laid last fall, and the use of the kerosene pans or hopper-dozers in the destruction of the young locusts that did hatch, the twelve counties in the two States of Minnesota and North Dakota saved by actual computation on wheat alone the neat little sum of $400,000. This, mind you, in a year not considered a locust year, and not to take into consideration what was saved to the region for other crops and the injury that might have resulted next year had the hoppers not been destroyed. With every favouring circumstance, the comparatively few locusts of this one species that have thus far been destroyed, the present year in this region would have been sufficient to overrun at least calculation the entire area of the State of Minnesota, the two Dakotas and Nebraska, along with portions of Iowa and Kansas. True, these favouring circumstances might never occur, but it is always best to be on the safe side. This we should know from our past experience with this same insect.

"Native" locusts, while perhaps not to be dreaded equally as much as the species just spoken of, certainly can commit an equal amount of injury when size and numbers of the insects are taken into consideration.

s true, get up and fly away to regions new, but they are eders with favouring conditions. They can be destroyed if not better than can the Rocky Mountain species, on r local restriction even in the regions where found.

MEETINGS OF THE MONTREAL BRANCH OF THE ENTOMOLOG Y OF ONTARIO.

The 162nd meeting of as held on April 14th, at 74 McTavish Street, Mr. H. H. Lyman, dent, in the chair. Owing to some of the members being busy with college examinations the attendance was not so good as usual.

Mr. Lyman read a paper entitled, "Can Insects Survive Freezing?" quoting from several well-known authorities on Entomology in favor of an affirmative answer to this question. A number of very interesting specimens were exhibited by the members. After spending some time in examination of these, and discussion, the meeting adjourned.

The 163rd regular and 18th annual meeting of the branch was held on May 12th, at 74 McTavish Street, Mr. H. H. Lyman, President, in the chair. The attendance of members was good, including the Rev. Mr. Fyles of Quebec.

The annual report of the Council for the past year, and the Treasurer's report were read, and will be published, as usual, in the next report of the Society.

Mr. Hausen read a paper entitled, "Some Little Known Canadian Coleoptera," containing descriptions of two new species, viz., *Zilora canadense* and *Philonthus stictus*. This paper has been published in the Record of Science, Vol. IV., p. 319, with plate.

Rev. Mr. Fyles read a note on *Nematus pallidiventris*. A European species of saw-fly lately introduced into this country, with description of larva, pupa and imago. (See CAN. ENT., XXIII., p. 135.)

After spending some time in discussing these papers and examining specimens, the meeting adjourned.

The 164th meeting of the branch, held on June 18th, was principally devoted to "sugaring" for moths on Mt. Royal, but Noctuidæ seemed to be scarce and very few were attracted. The meeting was held later at 74 McTavish Street, Mr. H. H. Lyman, President, in the chair. Mr. Hausen read a note on "The Occurrence of *Platynus rugiceps*, Mann., at Montreal," and after some discussion the meeting adjourned.

A. F. WINN, *Secretary*.

A NEW SPECIES OF CERURA.

BY GEORGE H HUDSON, STATE NORMAL SCHOOL, PLATTSBURGH, N. Y.

Cerura modesta, n. sp.

Male.—Front and vertex nearly white. Collar a little darker, tinged with a faint creamy yellowish-brown. Thorax dark steel-blue, almost black, with metallic purplish reflections, the orange scales forming so marked a feature in other species either entirely absent or with but a faint trace of their presence. Patagia concolorous with thorax, edged outwardly with white. Abdomen black above, or nearly so, the segments bordered behind with pale cinereous, thickly clothed with long fine white hairs, whitish beneath.

Primaries on outer third nearly concolorous with collar, not white as in *borealis* and *aquilonaris*, whiter towards base; spots and bands an even blackish dull purple, nearly concolorous with thorax. A spot at the base of subcostal and median veins; and just beyond this, a row of four similar spots crossing the wing at nearly right angles to the costa and forming a straight, or almost a straight, line. A wide mediam band, from 3.7 to 5 mm. on costa, inner edge nearly straight, parallel with the row of four spots, outer edge slightly excavated just above and below median vein, narrowing to from 2.5 to 3.8 mm. and widening again at inner margin to about the same width as on costa, often appearing wider on inner margin from its union with other outer lines. Subterminal band from 3 to 4 mm. wide on costa, outer edge nearly parallel with margin to near the anal angle, narrowing rapidly on the inner edge from vein 5 to vein 3, where it becomes obsolete, appearing again at near anal angle. Between the median and subterminal bands, there are three very fine almost obsolete lines, one within or including the elongated prominent discal spot, the others, beyond this, scalloped, slightly pointed and a little darker on the veins; these lines become more distinct at inner margin, where they often unite with the submedian band. The pattern is much like that of *occidentalis*, and the fine lines are similarly marked by spots on the costa. The two bands are very uniform in colour, are not bordered by darker lines, and show almost an utter absence of the edging of orange scales found in other species. The terminal intervenular spots are very small, as small as in *albicoma*. The vestiture is thin, the scales narrowing more rapidly than in *borealis* and *aquilonaris*, as you pass from base to external margin, giving the outer part of the wing a

rent appearance, the ends of the scales are more serrate appressed to the membrane.

nearly concolorous with primaries, paler, with a diffuse widest opposite the discal spot and expanding again at one specimen there is another narrow band just before inal and subparallel with it, more distinct beneath. Interven- connected by l line of the same colour.

Beneath, paler, discal sp... d distinct. On primaries the median and subterminal bands ... throughout their entire length, covering the entire wing, save only the basal portion, a narrow whitish costal streak, and a narrow and quite uniform whitish band on the outer margin of the wing.

Expanse, 40 to 44 mm.

Described from seven males.

I have taken the species from the electric lights in Plattsburgh, N. Y., in 1887, 1890 and 1891, as follows: May 9–3, 10–4, 12, 13, 15–5, 19, 20, 21–2, 23, 26, 27, June 1, 11, 20. The figure after the date shows the number taken, where the date alone occurs but one specimen was taken. *Occidentalis* has not been taken before May 11th, and *cinerea* and *borealis* not before the 28th.

DESCRIPTION OF A NEW SPECIES OF ARGYNNIS FROM ALBERTA TERRITORY.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Argynnis Victoria.

Male.—Expands two inches. Upper side pale fulvous, primaries a little obscured next base, secondaries largely, the dark area covering nearly the basal half; the black markings rather heavy; a common black marginal border, narrow on primaries, one-third wider on secondaries; a common series of small submarginal spots, sub-oval on primaries, crescent on secondaries, and on neither wing touching the marginal border; the rounded spots largest on primaries; the discal angular band on same wing heavy, on secondaries light; a bar on arc of cell of primaries, another crossing the cell a little within, a rounded elongated spot depending from subcostal, near middle of cell, and a crescent close to the base; in the submedian interspace an angular cross bar; on secondaries a V shaped spot at end of cells.

Under side of primaries faded fulvous, brownish over basal part of cell; small patches of orange-ferruginous in the sub-costal interspaces; the markings repeated, reduced, pale; secondaries orange-ferruginous, deepest next base; a marginal black line, and within and parallel a heavier one; next this on each interspace is a small yellowish patch which crosses the inner line nearly or quite to margin, and on basal side are a few black scales, which, in the two or three posterior interspaces, take crescent shape; the round spots repeated; close above these is a narrow transverse band of connected yellow-white crescents, not well defined, each with scattered black scales at top; across the disk a broad angular band of yellow-white, edged on both sides rather heavily by black; this may be considered as a chain of spots, as the separating nervules are black, and the one in the cell is prolonged nearly to the yellow band, and cut almost in two by the black edging of the arc of cell; the deep orange space beyond this discovers no spot except a small whitish triangle in cell, which is without black edging; at the base whitish patches at the origin of the interspaces and cell, sprinkled with black, the posterior ones edged black without. The mesial band has something of a margaritaceous sheen, but it is very slight and dull. Body red-brown above, beneath the abdomen is grey-yellow; legs red; palpi have long red frontal hairs, among which are a few black; antennæ fuscous above, red below; club black, tip ferruginous.

The female I have not seen, but Mr. Bean tells me that is essentially like the male.

Described from a single male taken with others of both sexes by Mr. Thos. E. Bean, at Laggan, Alberta. He says: "It is strictly alpine, and the rarest butterfly regularly found here. It flies in a part of the district which *Alberta* frequents, but at the highest parts of that district almost altogether, and it differs entirely in its habits from *Alberta*. The sexes are alike, but the female is moderately larger than the male. It is the most difficult butterfly I have found to capture. The last week in July seems to be the time of flight." There is no other American species with which to compare *Victoria* It is as large as the Laggan *Eurynome*, but has the peculiar mesial band (under hind wing) of the *Chariclea* group, though with a difference, both edges being more regular, and the colour white. That two new species of Argynnis should have been discovered by the indefatigable naturalist at Laggan is noteworthy. Doubtless many more remain to reward the labours of other zealous workers in the vast unexplored regions of British America.

IERINTHUS OPHTHALMICUS, BD.

umber of CAN. ENT., page 143, Prof. French described
la of this species but did not observe the egg and first stage.
ly, as follows :—
cal, flattened above and below, smooth, slightly shiny;
colo... probably green. scope it is seen to be covered
with crowded minute shallo.. Dimensions, 2.0 × 1.8 × 1.3
mm. Laid singly on under surfac

First Larval Stage.—Head rounded, slightly bilobed, not pointed as in the next stage, green, slightly shiny, and dotted with yellow, but not granulated, with a curved yellow line from before the eyes on each side, meeting each other below the vertex. Antennæ and labrum white ; jaws and ocelli black. Width, 1 mm. Body annulated, minutely pilose and dotted with yellow, with a distinct pale yellow subdorsal line and oblique lateral lines on joints 5–12, occurring above and below the subdorsal line, but dislocated, except on joint 12 where a single distinct line runs to the base of the horn. Horn minutely pilose, dark red, pale at base, 2 mm long.

The second stage is as described by Prof. French ; width of head, 1.5 mm.

Food Plant.—Poplar (*Populus*). Larvæ from Mariposa County, California.

HARRISON G. DYAR.

CORRESPONDENCE

MELITÆA PHAETON.

Sir,—While spending a few days in Ottawa, during July of last year, I was fortunate enough to find a batch of the larvæ of *Melitæa phaeton*, which composed a large colony in their tent-like web upon the tip of a robust stem of *Chelone glabra*, which is their favorite food plant in that district. I was anxious to breed the species, so boxed the whole colony and brought it back with me to Port Hope. Here, however, I could not find any plants of *Chelone glabra*. Upon turning up Scudder's "New England Butterflies," I found that honeysuckle, *Lonicera*, was given as a food plant. I first offered the larvæ leaves of trumpet honeysuckle, obtained from a neighbour ; but, as this was not convenient, I resolved to try them on Tartarian honeysuckle, of which an abundance grew in the

garden. They took to it with comparative readiness, and much to my delight I succeeded in bringing a goodly number through the winter. I hibernated them in an area window below the surface of the ground, but without any special care. Towards the end of April, as soon as the young leaves began to unfold, I took them out of winter quarters and fed them again on the Tartarian honeysuckle. The first specimens began to pupate about the end of June, and in July I had the pleasure of seeing the perfect butterflies.

A. M. BETHUNE.

Port Hope, August 28, 1891.

HALISIDOTA TRIGONA.

Sir,—When describing this species in Kansas Transactions I gave the differences which I observed between Herrich-Schæffer's figure of the Brazilian species, *specularis*, and my material. Mr. Dyar's note was therefore not warranted and, had he seen the Kansas Transactions, he probably would not have published it. In reply to Mr. Smith's note, I would state, that I have not seen the British Museum material. I do not know whether this is correctly determined, but I should rely on Mr. Butler's comparisons, as he most certainly knows Herrich-Schæffer's work. The type of *specularis* came, I presume, from Boisduval, and will in this case be accessible to study. The matter will probably be settled by the bringing together of fresh material from the south-west and by breeding the North American species. In the meantime *trigona* must stand as the first description of a North American species belonging to the *specularis* group, which seems to belong, more particularly, to South America.

A. R. GROTE.

LIMENITIS LORQUINI.

Sir,—Please correct my statement, p. 174, that "the second brood of larvæ (of *L. lorquini*) probably hibernate in the second stage," etc., to the following :—" Part of the first brood, and the entire second brood, pass the winter in the second larval stage in hibernacula formed of the basal part of a leaf spun together at the top."

H. G. DYAR, Yosemite, Cal.

AGROTIS SUBGOTHICA.

to Mr. Tutt's note in the July number of the CAN. ould state that I have no knowledge of Haworth's work *ica* is described. I have everywhere taken Stephens's ns of Haworth's species. Now Stephens figures *jaculifera* e, as figured in al, typical *jaculifera*, as *sub-ica*, of Haworth (?). ns is wrong, and Haworth's *subgothica* is a variety of *tritici* an American species, this latter must be known as *jaculifera*, and Prof. Lintner's name of *tricosa* must then clearly be retained for that species, as insisted upon by myself. Stephens's figure is unmistakably based on our American species; how nearly the European *tritici* resembles this I cannot, at the moment, say. The following will be the synonymy of *Agrotis jaculifera*. According to Mr. Tutt's statement that *subgothica* of Haworth is a variety of *tritici* of Linné, our American species must be listed as follows:—

jaculifera, Guen., fig.
  subgothica, Steph., fig. in err.
tricosa, Lintner.
  jaculifera, Guen. var. A.
  jaculifera, Smith, in err.
herilis, Grote.
  jaculifera, Guen. var. B.
  herelis, Smith.

A. R. GROTE.

SOME CORRECTIONS.

Sir,—In my paper, CAN. ENT., page 152, I say I have placed *Agrotis costata* and its near ally *A. idahoensis* "together wrongly," line 10. It is clear from the context that I meant in a wrong position in my lists. The two species are closely allied, differing in colour, *costata* being reddish, *idahoensis* purplish, and, in *costata*, the pallid costal region is whiter and broader. The two belong together. I have always associated them, and, indeed, described the one comparatively with the other. The types are in British Museum. On page 148, line 6 from bottom, for grouping, read association. On page 151, for "The Practical Entomologist," read the practical entomologists. I was writing, not of a publication, but of a class of working entomologists, whose figures (mostly duplications of the same cut) confounded the three forms: *subgothica*, Stephens (=*jaculifera*, Guen.), *tricosa*, Lintner (=*jaculifera*, Smith), and *herilis*, Grote (=*herelis*, Smith).

A. R. GROTE.

Mailed September 21st, 1891.

The Canadian Entomologist.

VOL. XXIII. LONDON, OCTOBER, 1891. No. 10.

DESCRIPTIONS OF SOME BUTTERFLY LARVÆ FROM YOSEMITE.—III.

BY HARRISON G. DYAR, YOSEMITE, CAL.

Phyciodes mylitta, Edw.

Egg.—Not observed; but laid about 50 together.

First Stage.—Head shining black; width .25 mm. Body cylindrical; cervical shield and anal plate black; fine black hairs, slightly curving forward, arise from minute black elevated spots.

Second Stage.—Head black and shiny; width, .40 mm. The body is covered with rows of conical elongated tubercles, each with many bristly hairs, arranged as in the mature larva. Sordid greenish, shaded with black dorsally, the cervical shield, anal plate and tubercles black.

Third Stage.—Head slightly bilobed with a few hairs; shining black, labrum pale; width .60 mm. Cervical shield and anal plate black, the processes on the body densely spined, not long, the three upper rows on each side black, the rest short and pale. Body blackish on the dorsal half, with a black dorsal line; subventral and ventral regions pale whitish. Thoracic feet black, abdominal feet blackish.

Fourth Stage.—Head slightly bilobed, rounded, ocelli large, mouth projecting; a number of hairs, colour shining black, labrum whitish, hair black; width 1.1 mm. Body covered with conical processes, .50 mm. long, densely spined and arranged as in *Junonia*. The body dorsally, including the cervical shield and anal plate and the three upper rows of processes, deep black; grayish laterally and subventrally, the fourth row of spines and a stigmatal band running along their bases subtranslucent white. Thoracic feet and last pair of abdominal feet black, the others much paler; claspers white.

Fifth Stage.—Head black and shiny, slightly hairy, a whitish streak on the side of the vertex of each lobe; width 1.8 mm. Body black

ubventrally, with a faint geminate yellowish dorsal line. ed tubercles of rows (1)-(3) are black, rows (4)-(6) acles black; thoracic feet black, abdominal pale. As s subdorsal, stigmatal and substigmatal lines appear, not ...l formed of yellowish mottlings on the black ground

lis.—Of usual ...t carinated but with three blunt points, the anterior pa... ...ses moderately prominent; a depression between thorax and abdom.... Abdomen straight along the ventral side, curved dorsally, with five rows of short, blunt points, cremaster flattened, rather long, colour nearly uniform, dull wood-brown from black mottlings on a reddish-brown ground colour, the dorsal tubercles reddish. A row of minute white dots on antennæ cases and around borders of wing. Length, 12 mm.; width, 4 mm.

Food Plant.—Thistle (*Carduus*).

Chrysophanus arota, Boisd.

Larva.—Elongate elliptical, flat below, the feet all short; sides sloping; dorsum forming a narrow flattened ridge, slightly wider on joints 3 and 4; body highest at joint 5 and tapering to the extremities. Head retracted under joint 2, pale testaceous, the mouth parts surrounded with brown; width in the last stage, 1 mm. Body minutely pilose, with very small white granulations, or subdorsal white line along the ridge interrupted at the segmental sutures (which are deep), beginning on joint 3, most distinct on joints 3 and 4, somewhat fainter centrally, and somewhat more continuous posteriorly. A similar fainter line on the subventral ridge, becoming obsolete at the extremities. Both lines look as if not quite on the surface. Spiracles small, circular, yellowish. Cervical shield in the middle of joint 2, very small, triangular, depressed. Length, 17 mm.; width, 5 mm.

Chrysalis.—Robust, short, rounded; depression between the thorax and abdomen small; abdominal segments appressed, motionless. General colour sordid green, most distinct on the abdomen dorsally; thorax with a few black specks and a smoky black dorsal line which is continued in a row of dots on the abdomen. Each side of this, on the central part of the thorax, is a white streak, supplemented on the posterior part by a short white curved line. On the abdomen, a subdorsal row of black

spots and a number of smaller black dots, besides an obscure white line on the posterior part, each side of the dorsal row of dots; abdomen pinkish laterally. Length, 12 mm.; width, 5.5 mm.

Food Plant.—Wild gooseberry (*Ribes*). The larvæ occur several on the same branch, but they feed singly.

THE LARVA OF ZOTHECA TRANQUILLA, GROTE.

BY HARRISON G. DYAR, YOSEMITE, CAL.

Eggs.—Laid in a mass, probably under the bark of the food-plant, for which purpose the long ovipositor of the ♀ moth seems fitted; the winter is probably passed in this state. Spherical, but somewhat misshapen from being closely pressed together; smooth, slightly shiny, under the microscope appearing irregularly indented; colour, yellow, becoming later reddish; diameter, .5 mm.

There appear to be six larval stages, the last two of which are all that came under observation, and to them the following description applies: The larvæ live singly, each in a leaf of its food-plant, curled over and lined with silk.

Larva.—Head entirely black, except the bases of the antennae, which are whitish; smooth, shiny, but under a lens seen to be slightly shagreened; a few hairs. Width in the fifth stage, 1.8 mm.; in the sixth, 2.8 mm.

Body plump and smooth, tapering at the extremities, curled spirally when at rest. The small black piliferous dots are normal in arrangement; row (4) stigmatal, posterior to the spiracles; rows (5) and (6) anteriorly and posteriorly in the subventral space, and row (7) the dots on the venter of the apodal segments are very small. Dorsum dark olive-gray, containing a broad yellow dorsal band, which is broken into two round spots on each segment, the anterior one of which is twice indented, or nearly bisected on the dorsal line. This marking is narrower towards the extremities and becomes somewhat confused. Below the olive-gray is a narrow interrupted whitish subdorsal band bordered with black, a lateral blue-gray band and a broad yellow stigmatal band separated from the lateral band by a wavy black line. Venter bluish gray, streaked with black subventrally, feet yellowish, spiracles black. In another example the dorsal and lateral regions are concolorous, bluish gray, sprinkled with black streaks, the dorsal and subdorsal bands edged with black. The anal plate is unornamented.

med of silk, quite thick and not at the ground.

drical, the abdominal segments tapering, cases and y enlarged, cremaster tapering, flat, armed with short pitchy dark brown, almost black, paler in the three lon...al incisures. Length 17.5 mm., width 5.5 mm.

Food plant.—Elder (.

There is but one brood a . hs appearing during the last of June.

The appropriate and pleasing name of this pretty species was kindly sent me by Prof. Smith.

A TACHINID BRED FROM A CHRYSALIS.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

Meigenia websteri, n. sp.

FEMALE.—*Head* a little wider than thorax and abdomen. *Eyes* brown, very sparsely hairy; front and face not quite one-half the width of head; front a little prominent; frontal vitta about one-fourth the width of front, brown, lighter behind where it splits on each side of the ocelli; frontal bristles in a single row, descending a little below base of third antennal joint, some fine hairs on sides of front outside them; two orbital bristles; sides of front with a slightly brassy tinge; sides of face moderately wide, a little less than one-half the width of the facial depression, silvery, bare; face slightly receding, facial depression silvery, facial ridges ciliate to a little below base of third antennal joint; cheeks moderately wide, cinereous, hairy, with bristles on lower border; vibrissæ inserted at a little distance above the oral margin; antennæ not as long as the face, blackish, third joint slightly reddish at base; second joint not elongate, bristly; third joint not widened, more than three times as long as the second; arista black, microscopically pubescent, thickened more than half its length, three-jointed, the second joint hardly elongate; proboscis, brown, fleshy, not so long as height of head, labella well developed; palpi well developed, flavous, club-shaped, thickened and curved at the tip, black bristly; occiput cinereous, gray hairy below, with fringe of black hairs on orbital margins.

Thorax clothed with stout bristles and very fine short hairs, cinereous, with four narrow blackish vittæ ; scutellum, broadly light-reddish ochreous at tip, with two stout lateral macrochætæ, the posterior one reaching the base of third abdominal segment, also a discal pair, and a short, decussate apical pair. *Abdomen* rather broadly ovate, first segment black, somewhat abbreviated ; other segments cinereous, with a narrow blackish hind margin ; first segment without macrochætæ ; second with a lateral marginal one and a median marginal pair ; third segment with about ten marginal macrochætæ above, and others below ; anal segment armed with marginal and sub-discal macrochætæ. *Legs* black, bristly, femora somewhat silvery ; tibiæ with stout bristles, especially hind pair which are also ciliate on outer edge, a longer bristle in middle and another at tip ; claws and pulvilli slightly elongate. *Wings* longer than abdomen, without costal spine, grayish-hyaline, third vein spined at base ; apical cell ending a little before tip of wing, narrowly open ; fourth vein rounded at bend, without stump or wrinkle ; apical cross-vein nearly straight ; hind cross-vein sinuate, nearer to bend of fourth vein ; tegulæ whitish, halteres fuscous.

MALE.—Differs as follows :—Smaller ; front hardly more than one-third width of head ; face not so broad ; no orbital bristles ; antennæ nearly as long as face ; third joint about five times as long as the short second ; claws and pulvilli not elongate.

Length 6 to 7 mm.; of wing 5 to 6 mm.

Described from two specimens, ♂ ♀, from Professor F. M. Webster, and bred by him from a chrysalis. Lafayette, Indiana.

NOTES ON THE DYSDERIDÆ OF THE UNITED STATES.

BY NATHAN BANKS, ITHACA, N. Y.

The *Dysderidæ* is a small family of spiders occupying in a certain respect an intermediate position between the *Tetrapneumones* and the *Dipneumones;* the openings to the tracheæ are just behind the lung-slits, so that they may appear to have four lungs. The eyes are six in all of our forms. The mandibles are not small, in *Dysdera* quite large. The

uite simple in structure. Our genera may be separated table :

front of A. S. E. ..... *Usofila*
as far front as A., S. E. 2

. in front of ..... *Segestria*
M. E. as far back a. 3

3 { Three claws to tarsus ..... *Ariadne*
{ Two claws to tarsus ..... *Dysdera*

USOFILA GRACILIS, Keys.

Marx in Proc. Ent. Soc., Wash., 1890, Vol., II., p. 36, pl. I., fig. 6. Alabaster Cave, Cala.

This is quite unlike other *Dysderidæ* in general appearance, but is referred by Keyserling to this family.

DYSDERA INTERRITA, Hentz.

D. crocata, Koch. Marx Cat. Aranæ of temp. of N. Am., 1890.

D. interrita, Hentz. Proc. Bost. Soc. Nat. Hist., Vol. IV., p. 224, 1842.

" " " Spid. U. S., ed. Burgess, p. 20, pl. II., fig. L, 1875.

" " " Emerton, New Engl., Drass., Agal. and Dysd., p. 36, pl. VIII., fig. 2, 1890.

New Engl., N. Y., D. C., Md., Va.

ARIADNE BICOLOR, Hentz.

Pylarus bicolor, Hentz. Proc. Bost. Soc. Nat. Hist., Vol. IV , p. 225, 1842.

" " " Spid. U. S., ed. Burgess, p. 21, pl. II., fig. 3, 1875.

" *pumilis*, Hentz. Proc. Bost. Soc. Nat. Hist., Vol. IV., p. 226, 1842.

" " " Spid. U. S., ed., Burgess, p. 22, pl. II., fig. 5, 1875.

*M.E.—median eyes; A.S.E.—anterior side eyes; P.S.E.—posterior side eyes.

Ariadne bicolor, Hentz. Emerton, New Eng., Drass., Agal. and Dysd., p. 37, pl. VIII., fig. 3, 1890.

" " " Marx Cat. Aranæ of temp. N. Am., 1890.

" *pumilis*, " " " " " " " " " 1890.

New Engl., N. Y., D. C., La., Ala., Fla., Ohio., Va., Md., Pa., N. C.

A. pumilis is only the young of *A. bicolor*.

SEGESTRIA PACIFICA, nov. sp.

Length, 5.3 mm.; length of ceph., 2.3 mm.; length of abd., 3. mm.

Breadth of ceph., 1.3 mm.; breadth of abd., 1.5 mm.

Length of femur I., 2. mm.; Length of tibia I., 1.8 mm.

Color—Cephalothorax brown, darkest near front margin, yellowish towards posterior end; mandibles, reddish brown; maxillæ, yellowish; lip and sternum, brownish; palpi whitish, with dark ring at base of tibiæ; legs whitish, with brown rings at tip of femora, on patellæ, and near base and tip of tibiæ and metatarsi, first pair darkest; abdomen nearly white, with scattered reddish-brown spots, which form a large patch on the middle of the dorsum and a few smaller patches behind it; on the venter a broad median stripe reaches from the lung-slits to and around the spinnerets, which are yellowish.

Cephalothorax wide in front, but little wider in middle, rounded behind, head low, eyes six, S. E. touching, the A. S. E. not quite their diameter from the front margin, M. E. larger than S. E., touching, about their diameter from the front margin. Mandibles large, slanting, much thicker than anterior femora; maxillæ long; lip long and truncate at lip; sternum narrow in front, widest behind the middle; legs 1–4–3, 2nd pair lost; first pair of legs largest; abdomen nearly cclindrical, spinnerets short.

One specimen from Washington State [T. Kincaid].

MINUTES OF THE MEETING OF THE ENTOMOLOGICAL CLUB OF THE A. A. A. S., 1891.

(HELD IN THE CO[illegible]SITY, WASHINGTON, D. C., AUGUST [illegible] 1891.)

The Washington meeting of the Club was one of the most successful ever held in point of attendance and interest. Seven sessions were held, with average attendance of twenty-two, and minimum of eighteen. Forty-two persons registered and received Club badges, in the following order :—

Herbert Osborn, Iowa; John B. Smith, New Jersey; Howard Evarts Weed, Mississippi; D. S. Kellicott, F. M. Webster, Ohio; C. V. Riley, L. O. Howard, Washington, D.C.; James Fletcher, Ottawa, Canada; W. B. Alwood, Virginia; B. Pickman Mann, E. A. Schwarz, Washington, D. C.; Lawrence Bruner, Nebraska; A. J. Cook, Michigan; Paul Wallace, California; E. B. Southwick, New York; G. H. Perkins, Vermont; Geo. H. Hudson, New York; Wm. H. Ashmead, Florida; J. A. Lintner, New York; Howard H. Hopkins, Maryland; Martha E. Stuart, Nebraska; Lucien M. Underwood, Indiana; O. F. Cook, New York; Mary E. Murtfeldt, Augusta Murtfeldt, Missouri; E. W. Claypole, Katherine B. Claypole, Agnes M. Claypole, Edith J. Claypole, Ohio; E. W. Doran, Maryland; Geo F. Atkinson, Alabama; J. M. Stedman, North Carolina; Otto Heidemann, William H. Fox, Geo. Marx, Washington, D. C.; Charles Robertson, Illinois; L. H. Pammel, Iowa; E. A. Popenoe, Kansas; A. B. Cordley, George C. Schaeffer, C. L. Marlatt, F. H. Chittenden, Washington, D. C.

There was no lack of papers, and the daily programmes of the Club were published in the programmes of A. A. A. S.

MINUTES.

The Entomological Club of the A. A. A. S. met at 9 a.m. on August 19th, at Room 15 Columbian University, President Osborn in the chair; eighteen members present.

In the absence of the Secretary, the President called Mr. J. B. Smith to act as such during the reading of the address, and Vice-President Miss Mary Murtfeldt occupied the chair during the delivery of the

ANNUAL ADDRESS OF THE PRESIDENT.

BY HERBERT OSBORN, AMES, IOWA.

The Entomological Club has reason to congratulate itself upon the favourable conditions under which it meets. We are here in our national capital, a city in which every American feels a pride, and the beauty of which can but favour our enjoyment. We are in the centre of entomological activity for the United States—and I am tempted to say for the world, for I believe we should have to make diligent search to find any community where so many skillful entomologists are devoting their entire time to entomological problems.

We have here one of the finest insect collections in the country, a collection unique and invaluable in the richness of its biological material, and one which has already become of great use and a Mecca to entomologists all over the country. With all these favouring circumstances we can most certainly expect a profitable meeting, and I feel perfectly safe in saying that every entomologist here will return to the regular duties of his profession with renewed zeal, and with a better knowledge of the possibilities of entomological work, and a feeling that he has been many times repaid for the time and trouble he has expended in attending the meeting.

But with the knowledge of these favouring conditions and the thought of what should be expected in a presidential address on such an occasion, I confess that it is with great trepidation that I undertake the discussion of any of the many problems that are presented as living topics in the entomological field.

Our Club includes in its membership a majority of the working entomologists of America, each one alive to the advancement of his favourite science, eagerly watching for progress in every avenue of research and keenly anxious to favour every means of promoting its interest.

Each one then, we feel, has a special interest in the enlargement of the entomological fraternity, and in the means and methods for the training of the coming generation of workers.

, that while there are many important topics that could
basis of this address, I cannot possibly go astray in
tention for a short time with some thoughts concerning
lue of entomology, the training to be desired in it, and
ssible means for the growth of this work.

It is but a short time [illegible] was entirely excluded from
ge courses, or, if incl[illegible] ned but a fractional part of
zoology; and the training given had [illegible] eference to the actual work devolving upon an entomological student in the collection and study of his particular favourites.

Even at the present time, there are, so far as I know, not more than a dozen colleges in the country where entomology is given a place in the regular college curriculum, and in only about half of these does it form a required part of any regular college course. In some of these the required work consists of but a short course, devoted largely to economic subjects, and the student gets but a bare insight into the problems of systematic entomology, or the wonderful biological wealth belonging to this branch of science.

To the members of this Club it is of course unnecessary to urge the value of entomology as an educator, but I would like to call attention to it here for the purpose of emphasizing the matter and urging a greater utilization of it in educational work. While we ourselves may realize its value and give it all the rank proper, I fear we do not always insist as we might on the standing it deserves in this regard.

We do not need to depreciate the value of other scientific studies in order to uphold entomological work as one of the most suitable of all branches of science to form a part of a course in scientific training.

That it requires close application, careful attention to details, and thus exercises in fullest degree every faculty of observation, is a necessary consequence of the minuteness and complex organization of insects. It presents, therefore, every advantage offered by botany or any branch of zoology as a means of training the faculties to close observation.

It is stated of Cuvier, that being applied to by a young man who desired to become a naturalist, for advice as to the course he should pursue, he answered, "Go and study entomology."

We believe fully in the necessity of a thorough foundation for entomological as well as any other scientific work, and would by all means advise students intending to enter this field to learn so much of chemistry, physics and general biology as to equip themselves for handling the intricate problems of life which must of necessity be met in any thorough study of insects. But, we would like to urge also the advantage to be gained by devotees of other branches of science if they would use the subject of entomology as a part of their mental equipment. Not only is the training to be gained one that is of the highest value in the cultivation of the faculties we have mentioned, but the facts acquired are of a nature to be used in every calling in life in which the student may engage.

We are all often amused by the questions propounded to us about insects, questions often from highly educated people, which display the direst ignorance concerning some of the most elementary principles of entomology. This condition is one of the greatest hindrances to the adoption of remedies based on any biological foundation. Confusion of species, lack of any idea of the metamorphosis of insects (except possibly some of the most common), and total ignorance of the structure of insects or of the physiological features which enter so largely into the use of remedies, all combine to render the intelligent adoption of the necessary measures in insect warfare difficult.

Education in these matters must be in considerable part by personal means. Teachers in higher institutions must train the teachers who carry knowledge to the academies and high schools, and these in turn must furnish the training in the lower grade and country schools. Will the time ever come when the country teacher will be qualified to answer common questions about insects that may be propounded by his pupils, to give them accurate instruction concerning the most essential principles of the science, or to direct them in the proper methods by which they can get facts by their own observation.

There is no question as to the fascination of the subject, each one here by his presence attests this fact, as attractiveness of the study is the main motive for its pursuit, and the wonder is that so few carry an interest in the subject beyond the enthusiastic collecting of youthful years.

It is true that entomological study soon becomes serious work, when undertaken with any purpose or effort to further knowledge along any of

work is very pleasurable, and unless in the complexity ne disheartening number of forms or amount of literature seem to present no insuperable difficulties not to be met other nces.

It perhaps almost unfortunate that there has been a fashion for a years past to discredit matic work, and to laud the researches in histology and embryol the only work deserving the name of science. The tone of contempt that has sometimes greeted the faithful worker in systematic entomology must have had the effect of discouraging some who might otherwise have made valuable contributions to the science.

We should not be narrow, but let our sympathies and appreciation be as extensive as the group in which we are interested; our perceptions of the earnest effort and the good in others as sensitive as the organizations which we place under our microscopes; and our encouragement as quick as the movements of our tiny friends.

The work in histology and embryology is essential, and its importance cannot be ignored. Often giving us the only rational method of discovering affinities, it must be resorted to by the systematic student, and none need underrate it. The further study of entire life-histories of insects, one of the most fascinating of all branches of study, presents a field of such great importance to the economic entomologist, so rich in discovery as to modes of life, and so often important in revealing the affinities of related groups, that he who would neglect or deride this part of entomology must have little conception of its range.

But systematic work too has its place and importance, and I trust the time is now coming when there will be a return of workers to this field.

The need of collections and libraries for this work is appreciated by all, and has been well discussed in the address of last year.

I would like to suggest, however, in this connection the importance of the preservation of collections that have been the basis of systematic work by a specialist. Often such collections go to ruin, and the question comes again and again, would it not have been better if such collection had been placed in some established museum, where its preservation would be assured. I believe fully in the formation of working collections, particularly in limited groups, but when it is possible to deposit such a collection

in a place of permanent preservation, I feel that it should be done for the benefit of future students and the advancement of science.

At present the student of systematic entomology must perforce select some limited group, the literature of which he can obtain, and faithfully divorce himself from the pursuit of knowledge in other groups.

This is well and proper for the worker who has gone far enough to become enamored with his specialty and to recognize the limitations necessary, but there are many young students enthusiastic and active whose ardour would carry them through bravely, if but they could pass through the doubtful stage which comes with the conviction that there are many insects which cannot be determined.

Failure to name his collection, or a disheartening search through all the books at his command without getting any clue to the affinities of his specimens, dampens his ardour and quenches his zeal.

The necessary training for the more serious entomological work and that which must in large part be given by means of carefully arranged courses of study, should, I believe, embrace methods in systematic entomology—of studying the complex life-histories of insects, and of working out the problems of minute anatomy and embryology that so constantly confront us. A thorough knowledge of insect anatomy is essential and should be acquired before the student attempts original work on morphology or revisional work in classification. Above all, the student should become impressed with the importance of accuracy, both in study and in statement, and it should be the crowning glory of this as well as all scientific work to develop in the student the keenest perception of the fact that scientific work means truthful work.

The equipment to carry on such instruction is not essentially expensive, and the cost of equipment should not deter any well-endowed institution from providing thoroughly for good work. The item of books will figure largely, but these may be selected as needed and no immense outlay is required at once.

One of the most difficult problems met by the teacher is to supply satisfactory guides to his students in classificatory work, and I believe every working entomologist will concede the desirability of a condensed manual for the determination of the families and genera of the insects constantly met in his work. The question is, how can such a manual

l? The work is evidently too great for any one individual, group to be serviceable must be prepared by someone e group; and, furthermore, the entomological workers of too much engaged in active professional studies to devote e to such work.

at some combined ... eems apparent, and I know no better place to inaugurate suc... in in this Club.

There are already many valuable analytical tables, but these are scattered through so many publications (many of which are inaccessible to general students) that to be of service in the particular manner I have in mind, they should be brought together in some compact single volume, with such directions as to their use, as to make them serviceable without a specialist at hand.

I would suggest that a special committee be appointed at this meeting to consider the possibility of preparing such a work, either as a special effort of the club or by simple co-operation among members of the club, who are willing to assist by allowing the use of tables already prepared, or the preparation of new ones in the group with which they are familiar.

Such a manual would necessarily have certain limitations, and, doubtless, at first, some imperfections, but the scope of the work may probably better be discussed in a special committee, should it please you to form one, and the matter of imperfection is incident to every new undertaking.

The cordial reception which this suggestion has met with from some entomologists to whom I have presented it, and their generous offer to allow the use of tables they have published, and to revise and extend them, have encouraged me in the belief that such a plan can be worked out. The matter seems to me of such vital importance, especially in college work and for students who desire to make entomology a serious work, that I believe we should not be discouraged by the difficulties which certainly exist in such an undertaking.

Another matter to which I desire to call your attention is that of a general gathering of entomologists during the Columbian Exposition. We are all aware of the pleasure of meeting our national co-labourers in this field, and if arrangements are made so that a general congress of the entomologists of the world can be had, I believe the interest and profit of the occasion will be great.

In the establishment of the World's Congress Auxiliary of the Columbian Exposition, I understand that such a gathering is contemplated, and that such a general meeting will be provided for, if but the entomological societies and individual entomologists will co-operate in the movement. The time indicated in their circulars seems hardly propitious, as it would seem far easier to secure such a gathering at the time of the meeting of our Association of Economic Entomologists, but, doubtless, the preference of that Association and this Club will be considered, as without their support such a congress could not succeed.

It would seem to me very proper that the club pass a resolution endorsing the effort to arrange for an Entomological Congress, offering its support and designating the officers for the coming year, as the medium of communication concerning any matters requiring action before our next annual gathering, and, if deemed wise, some special instruction as to an effort to arrange dates which will accommodate the entomologists of the country best.

As entomologists we should uphold the standing of our profession. We are sometimes met by evidences of a sentiment hardly complimentary to our calling, an apparent feeling that the entomologist may be a harmless sort of fellow, who catches bugs in a net and then puts them in a bottle; but that for any important work in this life he does not amount to much. This feeling, I am glad to say, seems to be changing rapidly, and in this connection I feel impelled to remark that in my opinion entomologists owe a debt of lasting gratitude to the distinguished head of the division of entomology for the status given to entomological work in the U. S. and throughout the world. To him, I believe, more than to any other one man is due the credit of placing entomological science alongside of other branches of science in the respect and confidence of the people, and thus bringing our profession from the position of a harmless pastime to one of recognized standing alongside of other branches of applied sciences.

Let us, as entomologists, in all our work endeavor to keep this standard high, to avoid anything like the quackery which drags itself alongside of scientific medication.

* * * * * * * *

Mr. Mann moved a vote of thanks to the President for his excellent address, which duly carried.

of Mr. Mann it was resolved that a committee of three be nsider the recommendations of the address, and report as convenient.

Mann, Fletcher and Smith were appointed as such committee resident.

President sugges on Programme, and on motion of Mr. Mann, amended by hat the Secretary be one of the members, it was so resolved.

Messrs. Webster and Kellicott were appointed the additional members of the committee.

On motion, Mr. Smith was elected acting Secretary for the present meeting.

Mr. Webster moved that one meeting of the Club be set aside for short notes and random observations, and Dr. Kellicott amended by suggesting that the next meeting be so set aside. Both motion and amendment carried.

On motion of Mr. Mann, after some general discussion as to hours of meeting, the Club adjourned to 1 p. m.

AFTERNOON MEETING.

The Club met pursuant to adjournment at 1 p.m., President Osborn in the chair, twenty-one members present.

The President stated that under the resolution adopted, short notes were in order, and he called on the members for such.

Mr. Kellicott mentioned a Tortricid feeding on *Silphium perfoliatum*, whose habits he studied last year, but of which he got only a single imago in bad condition and not yet named. The eggs are laid in the flower buds, and the larvæ eat into and destroy them. At this time the larvæ are livid in colour, and there become about half an inch in length; then they either crawl down outside, or bore through the stem to the root in which they feed until winter. They make a silken tube in which they hibernate and sometimes also pupate; usually in spring they crawl out into the loose soil and there pupate.

Mr. Webster spoke of a Cecidomyid larva preying on the cherry aphis, and exhibited specimens. The imago which was bred seems a Diplosis. *Hyperchiria io* he has usually found rather rarely; but this year he has received it from corn, where it was feeding in considerable numbers.

Scolytus rugulosus is common in the experiment orchard and very injurious, but does not attack healthy trees. Only such as have been injured in some way seem to be infested.

Lumbricus, sp. Quite young worms have been sent from the celery gardens of Northern Indiana, with the complaint that they injured the young plants, first in the hot beds, and, later, in the field after transplanting. The injury has been of quite a serious nature. The Buffalo tree-hopper, *Ceresa bubalus*, was sent from Richmond, Indiana, June 12, with the statement that they were destroying young tomato plants in gardens. The three specimens received were yet in the larval stage, and were at once placed on young plants in breeding cage. They attacked the plants just above the surface of the ground, puncturing the stems, causing a contraction and weakening of the stem, which soon fell over, though the upper portion did not wither or at once die. The affected part formed a distinct contraction, which was probably an eighth or an inch in length, and discoloured. Precisely similar attacks were made on a species of Tasmanian *Oxalis*, which stood upon the same table with the tomato plants, when the tree-hoppers were allowed to gather upon the stems. The last of the depredators finished the pupal stage on July 8.

The following species have been observed attacking the blackberry:—*Coleophora*, sp. The larvæ were observed eating into the tender expanding buds in April, and in May they were observed mining the leaves. No adults were reared, though attempts were made to do so; *Blennocampa pauperata* was observed ovipositing in the young buds in April; *Anomala binotata*, adults were surprised in the act of depredating on the foliage early in May, and an allied beetle, *Trichius piger*, was observed feeding upon the blossoms in June. The larva of *Eccopsis permundaria* was found eating into the fruit in May, the pupal stage lasting twelve days, and the adult emerging May 21.

The clover hay worm, *Asopia costalis*, was found in abundance in northern Ohio, April 27. Pupation was observed among these May 25; adults emerged June 12. These last oviposited June 13-17, and apparently these larvæ were found in heads of living clover in breeding cage July 1st. Adults made their appearance on August 8, at which time pupæ and also half-grown larvæ were to be found in the cages.

Sandalus petrophya, male and female, were observed at La Fayette, Indiana, on red or swamp maple, *Acer rubrum*.

Mr. Kellicott said *io* frequently does not separate until nearly full-

ıd a lot on chestnut, two of which pupated and emerged
others remaining in pupa until the following spring.

tated that his experience with *io* at Ames was similar to
y Mr. Kellicott, and he asked whether *Asopia farinalis*
ı clover hay. He at one time found the imago very abun-
clover was b[illegible]e could not say the larva was
of *farinalis*. No one p[illegible] to answer.

In reply to a question, Mr. Webster said he had seen the Cecidomyid larvæ feeding on the Aphids.

Mr. Ashmead said the habit is not uncommon. He has bred predaceous species himself, and Mr. Fletcher has recorded a similar occurrence.

Mr. Howard thought the habit could scarcely be called a common one; he recollected only two European records of that character.

Mr. Lintner spoke on the occurrence of an onion pest at Canastota and vicinity, in Central New York, during the month of June. The pest was reported as a dark coloured caterpillar of a maximum length of an inch and one-fourth, feeding on the plants above ground, overrunning large fields of onions in the muck lands north of Canastota, and consuming not only all of the onion tops but other vegetation also. From the account given, the caterpillar was believed at first to be the species of cut-worm that in the spring of 1885 proved so exceedingly destructive in the onion fields in Goshen and vicinity, in Orange County, N. Y., as recorded in Prof. Riley's Report to the Department of Agriculture, for the year 1885, viz.: *Agrotis messoria.* Comparison of the caterpillar secured later, showed it to be a different species, which, on being carried through its final stage, confirmed the identification of it which had been made from Prof. Forbes's admirable figure in his 15th Report, as *Agrotis ypsilon.* The moths emerged from the pupæ in the early part of July.

It was not possible at the time to visit the infested locality to note particularly the habits of the cut-worm and the amount of injury inflicted by it, nor could any definite or satisfactory information be obtained by correspondence, for the attack ceasing with the pupation of the larvæ, all further interest in it on the part of the onion growers seemed to be lost.

Mr. Lintner also read a letter from Mr. Geo. F. Shepley, asking for information concerning an insect which had bored galleries in the pine boards and in the linen contained in a closet, and had done much injury to the fabric. He asked whether any members recognized the attack.

Mr. Riley said the description was so indefinite that little could be made of it. A number of Ptinidæ made galleries somewhat as described; but without seeing the injury he would not venture an opinion.

Mr. Campbell stated a somewhat similar experience. From some spruce boards, employed in building, a small species of *Monohammus* issued. He suggests that the linen was bored simply to get out, and not because the insects had any liking for the material.

Mr. Mann observed that in his laboratory fittings white pine was used for shelving and drawer cases, and that from this issued a longicorn which he thinks was *Xylotrechus colonus*. He thinks they would have pentrated linen or any other substance to make their way out.

Mr. Smith noted the capture of *Cicindela lepida* at Jamesburg, N. J., July 4th, 20 miles from the nearest sea shore at which this insect had been previously found.

The Elm leaf beetle had been again closely watched during the past season, and again the insect had been found to be single brooded. The injury done first by the hibernating beetles, then by the larva, and again by the new brood of beetles, has given the impression of as many broods.

Zeuzera is undoubtedly spreading. It has been found beyond Newark, and the injury by the larva was begining to be apparent on the elms of that city. The suggestion by Mr. Southwick at the meeting of the Association of Economic Entomologists, that elm had been referred to as the only food plant, was true only of America. In Europe it had been known as injurious to quite a number of widely different species.

Cryptorhynchus lapathi was spreading and was doing serious injury to willow. Nearly all the clumps of willows near Newark and Arlington had been destroyed, and some fancy and garden trees had been killed.

Mr. Howard said Walker had years ago given North America as a locality for *Zeuzera pyri*, and Morris had made the same statement. He asked whether this did not conflict with the idea that it was a recently imported species, and further, whether Walker might not have had the species described by Herrich-Schaeffer.

Mr. Smith replied that Morris had followed Walker simply, and that Walker's specimen must be examined and its history ascertained before its identity could be assumed. The species described by Herrich-Schaeffer was so entirely different that even Walker could not well mistake it. He had so little faith in Walker's determinations that he would not be surprised to find the American specimens to be *Ecpantheria*.

Mr. Howard further suggested that the elm-leaf beetle would be a good subject upon which to try the importation of parasites. Three species were known to infest it in Europe.

Mr. Riley expressed some surprise at Mr. Smith's experience with the elm-leaf beetle in New Jersey. At Washington he felt quite certain there were two broods, and New Jersey did not usually differ much in such matters from Washington. The date of hibernation—early August—was so very early as to be remarkable, and proved certainly that temperature had nothing to do with it.

Mr. Smith agreed that usually Washington and New Jersey did not differ in number of broods; but he had carefully watched these insects two years in succession, from day to day, and felt absolutely certain as to his facts. The beetles first ate round holes in the leaves, eating the entire tissue. The larvæ then ate on the under or upper side, usually the former; but did not eat through the leaf. This often killed off the foliage, leaving it dry and brown. A new growth would then usually start, and this in turn was injured by the midsummer beetles eating round holes in it. These beetles were never observed copulating; but after eating a week or two they retired. In the belfry of the college building hundreds had been found early last September, entirely torpid.

Mr. Riley said Mr. Smith's observations agreed perfectly with what he had noted; but he was not ready to admit that it was all caused, in Washington, by one brood. He felt quite certain that he had observed a second brood, which to some extent overlaps the first.

Mr. Lintner said, a strange feature was the habit of feeding quite extensively in fall, and then again in spring. He thought fall feeding should bring full maturity, as during hibernation they were almost torpid, scarcely even breathing. He had been watching the spread of the insect along the Hudson, and it has now reached to within twenty miles of Albany. He expects to hear of it there almost daily.

Miss Murtfeldt gave a brief account of a case where the screw-worm, the larva of *Lucillia macellaria* or something very like it, had attacked a lady near St. Louis. Over 200 of the larvæ were taken from the head and throat by means of forceps, and the patient must have suffered tortures. The larvæ differ a little from the figures she had seen, and she asked to have her determination verified.

Mr. Weed examined the specimens and thought there was no doubt of their being the screw-worm.

Dr. Marx made the announcement that he was now studying the ticks, but found considerable difficulty in getting material. He asked all members of the Club who had specimens, or could obtain them, to send to him for study. He would be glad to name and return material.

On motion of Mr. Mann the meeting adjourned.

Mailed October 7th, 1891.

The Canadian Entomologist.

VOL. XXIII. LONDON, NOVEMBER, 1891. No. 11.

OFFICIAL MINUTES OF THE MEETING OF THE ENTOMOLOGICAL CLUB OF THE A. A. A. S., 1891.

(Continued from page 222.)

AUGUST 20, 1891.

The Club met pursuant to adjournment at 9 a. m., President Osborn in the chair. Eighteen members present. The minutes of the first day's meetings were read, amended and approved.

Mr. Lintner spoke on

THE PEAR MIDGE, *(Diplosis pyrivora)* IN NEW YORK.

It had been brought to his attention as an injurious species during the present year. It has been abundant at Catskill, and in small numbers has extended to within 20 miles of Albany. After careful search he has found a single infested pear at the latter city. He gave a history of the investigations made in this country on the species, and detailed all that was known concerning its life history. The character of the injury done was carefully described and specimens were exhibited. He also gave a history of the experiments made to control the species, and spoke approvingly of a suggestion that some application to completely blight and destroy the blossoms of infested orchards, more particularly the Lawrence trees, be made to exterminate the pest. It is so numerous, 15 to 35 larvæ in a single pear, and 90 % of the entire fruit infested, that he ranks it among the most injurious, and with the pear *psylla* the most serious obstacle to pear growing in New York.

The larvæ mature about the first of June. They then emerge from the pears, usually during or after a rain, drop to the ground and bury themselves a short distance. In 10 days they make a cocoon covered with grains of sand; but how long they remain before pupating he could not say. He asked whether Mr. Smith's statements concerning methods of oviposition made before the Association of Economic Entomologists

was based on personal observation. It was at variance with the descriptions of this operation and somewhat surprising.

Mr. Smith replied that he had never watched oviposition, nor had it been watched in this country so far as he was aware. His statements were inferences based on examinations of infested fruit. The passage from the ovaries to the outside of the pear was large and open, so no necessity existed for a puncturing of fruit by either insect or larva. He further found that in a lot of infested pears placed on moist earth, most of the larvæ left the pear by this same aperture.

Mr. Lintner expressed surprise at this, and described his experience, which was that the fruit usually cracks transversely near its base, and that the larvæ make their way to the surface through these cracks.

Mr. Southwick asked as to the best way to breed Cecidomyidæ. He had been very unsuccessful with some species he had attempted to rear.

Mr. Smith thought no general rule could be laid down, as the habits of the insects differ so much. Our effort must be to keep them in natural conditions as much as possible.

Mr. Lintner agreed to this and added, that there was much difference in the ease with which species could be bred. With some, success was very difficult.

Mr. Fletcher found them easy to rear as a rule, if they were given the constant care and attention necessary. He thought the blighting of the blossoms might be done without injury to the tree, as the blossoms of many varieties expanded before the leaves appeared, and even if some leaves were destroyed at this season the injury would soon be repaired.

Mr. Lintner asked what material could best be employed?

Mr. Fletcher suggested the arsenites, and preferably London purple on account of its causticity.

Mr. Howard asked whether Mr. Fletcher had considered what effect this would have on the bees.

Mr. Fletcher said he had not. It was an off-hand suggestion; but sulphate of copper might be substituted, and would not, he thought, hurt bees. He was, however, rather sceptical as to the injuries to bees from spraying flowers, and intended next spring to experiment on this question.

Mr. Osborn asked whether the midge was confined to pear or was known to attack other fruits? He explained that he had found a Cecid-

omyid larva on choke-cherry, with habits very like those described, and thought it might possibly be the same.

Mr. Fletcher thought it unlikely that a pear insect would be found on *Prunus*. It might possibly be found in some allied forms like Cratægus. as is *Anthonomus 4-gibbus* at Ottawa.

Mr. Howard gave some notes on

THE ENCYRTINÆ WITH BRANCHED ANTENNÆ.

He gave a history of the gradual discovery of these aberrant forms, a box of which he exhibited, and explained by means of blackboard figures the nature of the curious antennal modifications. Excellent drawings of the species were also exhibited.

In response to a question from Mr. Osborn, he stated that one of the species was bred from *Bucculatrix;* but that the hosts of the others were not known.

On motion of Mr. Kellicott, the President appointed Messrs. Kellicott, Smith and Howard, a committee to nominate the officers of the club for next year.

The Club then adjourned until 1 p. m.

AFTERNOON MEETING.

The Club reassembled at 1 p. m., with President Osborn in the chair and twenty-seven persons present.

A paper by Mr. Hubbard being called for,

Mr. Schwarz stated that the communication to be presently read by the Secretary was not an elaborate paper, but a private letter hastily written by the author while still in the field. The insects mentioned therein had, of course, not yet been studied, and could only be determined by Mr. Hubbard after his return. But on account of the highly interesting information it contained, the letter was eminently fitted to be laid before the Club. No previous observations on the insect life in the Hot Springs of the Yellowstone Park seem to have been made, although this interesting locality had frequently been visited by scientific parties. In fact, beyond Dr. Packard's short article in the American Naturalist on a *Stratiomys* larva from a hot spring in Colorado, he was not aware that anything had been published in North America on the insect fauna of Hot Springs. Further, there was very little recorded of the general insect fauna of the Yellowstone Park, and he even remembered having seen

pupæ, which floated up against the edges of the basins
larva was also abundant in the geyserite precipitate that
mud in all these tepid basins. I soon found that this
insects, chiefly Diptera, but there is a very large and
and its larva, and also a common *Philhydrus*. The
in the tepid pools, while the *Ochthebius* inhabits water
much warmer. I regret that I had not a thermometer
the temperature. There is, of course, a little *Salda* run-
edges, and this seems to stand any amount of heat, as I
edges of springs which are actually boiling. But the
thing of all is the presence of two species of *Nebria*—one of
yellow legs; the other smaller, and entirely black, living
of geyserite about the hot springs, and even on the sides of
the largest spouting geysers, where they are liable to be
in a flood of boiling water. The larvæ of these *Nebrias*
the sulphurous geyserite sand near the hot springs and geysers,
near to the geyser vents as the imagos. There is, however, a
dium, with variegated elytra, which is always found under bits
and in the geyserite sand about every hot spring and geyser;
lives with it in the same places.

Firehole River, just below the Excelsior geyser, which contin-
pours rivers of boiling water into the stream and raises its tem-
to probably 70° or 75° F., there lives an *Elmis* of medium size;
found it rare and had not time to collect it in any numbers. In
stream of tepid water, running through a grassy plain, I found
same slender, undescribed *Elmis* which we took below the old
mill in Ogden Canon. It swarmed in this stream in countless
ions, every stone and stick was alive with it and its larva. There was
a *Corixa*, apparently the same species I took in Utah Lake. Here
swarms in incredible numbers, forming black masses all along the sides
the stream. Of course the stream was sulphurous and heavily charged
with mineral matter, so that sticks, moss and everything that fell into
water silicified or coated. All the stones and sticks in the
bottom ming with peculiar algæ of various colours. In the
e the upper geysers, where it is an ordinary mountain
ol, I found in debris in the water a marvellous *Elmis*
four times larger than the largest I ever saw. In the
peculiar aquatic larvæ, apparently Coleopterous, and

belonging to different families, but I did not get the imagos.

I found here, at the upper geyser basin, a few things on the spruce trees, but nothing new. There are one or two *Telephorus*, *Corymbites*, several *Dascyllidæ*, etc. *Malachiidæ* of the genera *Dasytes* and *Listrus* are also common here as elsewhere on spruce and pine. Nowhere else in Yellowstone Park have I been able to find anything on pines except these Malachiids. Beating trees and bushes seems to produce nothing at all. At the upper geyser basin there was a large meadow, which had over part of it a deposit of alkaline mud, dry and cracked in the sun. Here I find a gigantic *Aphodius* with variegated elytra *(A. hamatus ?)* under cow-dung. Only one specimen was alive, the others had been killed by the hot sun, and their dead bodies were very abundant on the mud or under dry dung. An *Elaphrus*, apparently *E. ruscarius*, was running about on the mud in the hot sun. In patches of cyperaceous grass in this alkaline plain I got a large Patrobus-like Carabid, or else a peculiar *Pterostichus*. There was also a *Stenus* under the dead grass.

On July 27th, at evening, we arrived at Yellowstone Lake. The shore of the lake, which I was not long in visiting, consists either of glacial boulders, or beaches of rather coarse, black gravel. No insects are thrown up by the waves at present, except, perhaps, an occasional Hemipter or *Coccinella*. However, there is a beach fauna, consisting of the usual black *Cryptohypnus* of large size *(C. funebris)*, a large black *Anthicus*, which is very common, and a much rarer species quite minute in size. To my great surprise I found here a single specimen of that same peculiar Coleopterous larva (*Saprinus ?*) with maggot-like body and almost obsolete legs, that I found among the Ephydras on the shore of great Salt Lake. There were also a few species of dark bronze or black *Bembidium* and an *Amara*.

On July 29th we were on the road from the Grand Canon to the Mammoth Hot Springs, which we reached late in the afternoon. I visited the nearest group of hot springs and found the usual fauna. The neighbourhood is cavernous, and a river of hot water runs beneath the hotel. Under stones there are crickets, which evidently belong to a subterranean species. We spent the next day at the mammoth hot spring, and I had a good chance to collect. I found the *Ochthebius* and other things in the hot water on the terraces, and under stones a good many *Amara*, *Pterostichus*, *Patrobus*, etc. A cedar appears here for the first time, and is growing on the terraces formed by the hot springs. On this I found, by beating, a

beautiful mottled *Anthicus*; not at all rare, and a few other things, Malachiidæ and Curculionidæ, etc.; among them a beautiful Otiorhynchid, with cream-coloured elytra, showing metallic copper-red colours beneath. On cedars below the hotel there was a *Helops*, some *Cistelidæ*, *Elateridæ*, and one specimen of a very large Longicorn of a genus allied to *Anthophylax*. Under loose stones on the dry hillsides I found good Carabidæ, *Harpalus*, *Amara*, *Pterostichus*, and a *Cymindis*, quite common. Continuing down the mountain side about 1,000 feet I finally reached the Gardiner River, which is a cool, rapid, mountain stream, bordered with tall willows, larch, birch, aspen, wild rose, cherry, etc. Here I find covered beaches with an abundance of *Nebrias* of several species. A large one, with yellow legs, may be the species found about the geysers. The black species are either very variable, or there are several species among them. I think the smallest, which has a tendency in some localities to become brown in colour, is not a *Nebria*, but belongs, perhaps, to *Pelophila*. There is also a very elongate black form which resembles a *Patrobus*, but is of very large size. Here I found a very neat *Elmis*, quite different from those known to me. It is moderately large, uniform dark-bronze in colour, and of very short, thick, form. It lives very differently from any *Elmis* I ever saw. It is *under* small stones close to the shore, and can only be found by disturbing the gravel with the hand, whereupon the beetles are upset and float about in the water, and seize upon the rootlets of willows that grow among the stones. This same Elmid I have found since in a little trickling stream which came down the steep bank of the Yellowstone River near this place. This little stream was as cold as ice, and densely shaded with nettles and a very tall umbelliferous plant. The Gardiner River was the first stream I had found that is a natural mountain torrent. All the streams in the western part of the Park are vexed with devils of one sort or another in the shape of hot water, sulphur and steam, and are full of queer, slimy algæ, deposits of lime, etc. The Yellowstone River which flows near me here is also partly sulphur water, but still it is full of trout, and its shores produce all the species of *Nebria*, *Pelophila* and *Patrobus* that I have mentioned. I find also in shady places, where moss grows under willows by the borders of the streams and in debris, a few *Bledius* and *Micrædus*, with one or two other *Omalini*. Deep in a pile of debris on the shore of the Yellowstone River near here I found also *Dianous*.

On July 31st we took a carriage from Mammoth Hot Springs and

came to this place. The distance is 18 miles, and the road ascends a high mountain chain and then descends into this valley, which is close to the junction of the East Fork with the Yellowstone, and is 15 or 20 miles below the Grand Canon. We are here in a most beautiful country of great diversity, and almost never visited by tourists. There are dense forests of spruce and fir, some of the latter reaching a good size; there are also parks and meadows, lots of streams, from the great Yellowstone River to the smallest brooklet. Rocks, grass-covered hills, wild flowers, desert plants, abound in infinite variety, and there are also warm springs near at hand. We are all of us very much pleased, and I have good collecting, while the freshest and most bracing mountain air invigorates all of us."

In commenting on this paper, Mr. Schwarz remarked that the glistening surface of large bodies of water was known to attract many insects, but that in the case of the hot springs of the Yellowstone Park, which are of small extent, we must in all probability seek for another cause to account for the multitude of insects that fall into the hot water. It appeared quite probable that the gaseous exhalations of these springs and geysers would prove to be the attractive cause, and he recalled the fact that at the solfataras of European volcanoes large numbers of suffocated insects had been observed, the presence of which could hardly be due to accident. Similar observations had also been made at the solfataras near Santa Barbara, Cala. Among the Coleoptera, found by Mr. Hubbard in or near the hot springs, the *Nebrias* are of especial interest, because we had hitherto been accustomed to associate the occurrence of these Carabids with cold streams and snowfields in alpine regions.

Mr. Lintner expressed his appreciation of the character of the paper, and complimented Messrs. Hubbard and Schwarz on the excellent service done by them in working up the fauna of special regions.

Mr. Lintner spoke on

THE PEAR PSYLLA (*P. pyricola*) IN THE HUDSON RIVER VALLEY.

He gave a review of the history of the species, described the methods of injury and discussed the possible remedies. He finds unexpected success in using the kerosene emulsion even against the mature insects. He briefly discussed the life history, finding that there were two broods at least. The eggs and method of oviposition were described, particular attention being called to a filament or pedicel-like prolongation of the tip.

Very severe injury had been done during the present year by the insect in the pear orchards of the Hudson River Valley.

Mr. Schwarz said that four species had been confused as *Psylla pyri* by various European authors ; that Dr. Franz Loew had, in the Verh. z. b. Ges. Wien, written exhaustively on the subject, and that Schmidberger's *pyri* is identical with *pyrisuga*, Foerster, which does not occur in North America. He had observed *pyricola* in Michigan, where it is not common and where, late in the fall, it assumed that intense coloration which indicates hibernation in the imago state.

Mr. Lintner spoke further

ON THE EYE-SPOTTED BUD-MOTH (*Tmetocera ocellana*) IN WESTERN NEW YORK.

This insect had been very destructive in the orchards of the western part of the State—many of the orchardists representing it as having caused them more harm in their apple orchards than all other insect pests combined. The caterpillar fed upon the unopened buds, on the blossoms, on the young leaves as they first put forth, webbing them together, on the advanced foliage, and it was also reported as boring into the young twigs. Its habit of concealment, after its operations disclosed its presence, made it almost impossible to reach by the usual application of the arsenites. From the severe injury that it was occasioning, it was very desirable that some method of destroying it should be discovered and recommended to our fruit growers. He had believed that eggs were deposited in the month of April by the parent moths, from some imperfect and denuded specimens that had been captured fluttering about the fruit trees at this time, and which seemed to be that species ; but Prof. Fernald and others had stated that the insect hibernated as a half-grown larva under a silken tent spun upon the fallen leaves. Some of the larvæ which Mr. Lintner had hatched from the eggs in June, had attained such size in early July when they died, that they should certainly have attained full maturity during the early autumn. He also exhibited specimens of the very remarkable, extremely flattened and disc-like egg, which he thought could not be the same with that which Prof. Fernald had described in Bulletin No. 12 of the Hatch Experiment Station for April, 1891. If the egg is deposited in the early spring, it could be killed by a kerosene emulsion ; if the larvæ hibernate in the fallen leaves, they could be kept from ascending the tree, or destroyed by collecting and burning the leaves.

Mr. Fletcher had found larvæ on apple twigs in winter in Nova Scotia, hibernating beneath a silken covering, which he thought were undoubtedly this species. He had also secured eggs during the past summer at Ottawa, where it had been one of the notable pests of the season.

Mr. Lintner also made remarks

ON SOME OF OUR ORGYIAS.

Some time since Mr. Smith named some specimens of *Orgyia* in his collection as *O. definita*, stating that there were no *leucostigma* in the Albany collections to his knowledge. More recently Mr. Dyar had seen the specimens, and had pronounced them all *leucostigma*. He also pointed out that the egg mass of *leucostigma* is covered by the female with a frothy mass. That of *definita* is almost bare, having only a slight covering of hairs, and there is no frothy substance whatever. He had reared from eggs received from Mr. Dyar a specimen of *definita*, which certainly seemed distinct from what he had in his collection. He had also bred *O. nova*, which deposited its eggs in a single layer upon the surface of the cocoon, without any covering whatever.

He had been especially interested in this latter species because of its supposed resemblance to the European *antiqua*, and would endeavour to get the early stages of both for comparison.

Mr. Smith said that the late Mr. Hy. Edwards had made such comparisons, and had frequently stated positively that they were identical. Concerning his determination of *definita*, he had just been working over the Meske material in the museum collection, which contained only what he took to be *definita*. Mr. Lintner's specimens were seen soon after, and were so well marked and clean that he deemed them the same, and said so. Since then he had seen the egg masses on trees at Albany, and finds them *leucostigma*. He had long known of the difference between the egg masses. Mr. Lintner had very few specimens; and he can only believe that the finest and most sharply marked specimens were retained, and these looked quite different from the normal, obscure and shabby specimens taken.

Mr. Lintner assented, that only the finer specimens had been retained.

Mr. Riley said that he had carefully compared *nova* and *antiqua* in all stages and found them identical.

Adjourned until the 21st inst. at 9 a. m.

AUGUST 21, 1891.

The Club met at 9 a. m., President Osborn in the chair, 27 persons present. The minutes of the second day's meetings were read and approved.

Mr. Mann stated that some enquiry had been made concerning the old minutes of the Club, of which all trace seemed to have been lost. He heard the remark, and remembered that they were in his possession. He gave a history of the Club since its organization in 1874, of its formation as a subsection of the A. A. A. S., which was not a success, and of the reorganization at the Minneapolis meeting, since which time it has flourished. He now turned over to the Secretary the book and its contents.

Mr. Kellicott moved that the Secretary be empowered to complete the minutes from published records, so far as they were obtainable and had not been already incorporated in the book. Carried.

The Nominating Committee reported, recommending for election :—
President, E. A. Schwarz, of Washington, D. C.

Vice-President, E. A. Popenoe, of Manhatten, Kansas.

Secretary, C. L. Marlatt, of Washington, D. C.

On motion the report of the Committee was unanimously approved, and the above gentlemen were elected accordingly.

Mr. Mann, from the committee to consider the recommendations of the President's address, presented the following report :—

To the Entomological Club of the A. A. A. S.:

Your committee, appointed to consider the recommendations contained in the annual address of the President, has attended to its duty, and begs leave to report.

In regard to an international meeting of entomologists, to be held in 1893, your committee deems the suggestion an excellent one. It is of the opinion that such a meeting should be held in connection with the meeting of the A. A. A. S. in that year, and that all entomologists should be invited thereto. It is expected that the Association of Economic Entomologists will invite and secure the attendance of home and foreign economic entomologists at its meetings, and it is recommended that the same excellent arrangement for co-operation be made in the future as was made for the meetings of this year, by which all members of the Associ

ation or the Club who have papers to read on economic entomology should be invited to read them at the meetings of the Association, and all who have papers on technical entomology or life habits be invited to read them to the Club. It is recommended that a committee be appointed to confer with the officers of the Association of Economic Entomologists to make the above suggested arrangements, if practicable, and to prepare and send out invitations, preferably in the form of a joint address from the two bodies.

In regard to the preparation of a Manual of Entomology, your committee deems it a matter of high importance that such a manual be prepared, and sees no insuperable obstacle thereto. It is of the opinion that this should be a technical work, for entomologists, rather than one calculated to interest and allure the non-entomologist. Such a work as that of Westwood's Classification, adapted more especially to the present status of entomology in this country, would be of inestimable value. In the opinion of the committee it should carry the classification to the point of the determination of genera by systematic tables, not undertaking further to describe or define the genera.

The committee recommends that the preparation of such a work be committed to several hands, and that the primary distribution of its subject matter be as follows, as nearly as practicable :—

Introduction and System—Dr. A. S. Packard.
Metamorphoses and Life-habits—Dr. C. V. Riley.
Hymenoptera—Messrs. E. T. Cresson and L. O. Howard.
Lepidoptera—Dr. J. B. Smith.
Diptera—Dr. S. W. Williston.
Coleoptera—Dr. G. H. Horn.
Hemiptera—Prof. H. Osborn.
Orthoptera—Prof. L. Bruner.
Neuroptera—Mr. Ph. Calvert.
Myriapoda—Mr. N. Banks.
Archnida (sens. lat.)—Dr. Geo. Marx.

It is expected that in the larger or more difficult groups the editors named would be at liberty to subdivide their work, and to call in such assistance as they might desire.

Respectfully submitted.

B. PICKMAN MANN.
J. B. SMITH.
JAMES FLETCHER.

On motion the report was received, and Mr. Mann moved its adoption.

Mr. Riley objected on business considerations, and detailed at some length the obstacles in the way of preparing and publishing a manual like that suggested. No definite plan had been presented, and the adoption of the report and an attempt made to carry it out might involve the Club in great difficulties.

Mr. Smith from the committee explained that all these difficulties had been realized by them, and hence, while their report was favourable, they had intentionally omitted any definite suggestions of a business character, realizing that this required much more time than they had, for consideration.

Mr. Osborn explained his views on the subject, and urged the necessity of a manual.

Mr. Mann thought such a manual must be prepared eventually, and that, with the backing of the Club, and with an array of names such as that proposed, no difficulty should be found in getting a publisher.

Mr. Riley suggested that the report be divided, and moved that the first recommendation of the committee, concerning an international meeting, be adopted. Carried.

Mr. Howard moved that the balance of the report be recommitted to the same committee, with instructions to report a well digested scheme one year hence.

Mr. Mann moved that a committee of three be appointed by the President under the first recommendation on an international meeting.

This was carried, and the President reserved the selection of the committee.

The President afterwards named Messrs. Kellicott, Howard and Fletcher.

At the request of Mr. Fletcher the official minutes of the Club were ordered to be printed in the CANADIAN ENTOMOLOGIST.

The following was then presented by the author :—

PRELIMINARY REMARKS ON THE INSECT FAUNA OF THE GREAT SALT LAKE, UTAH.

BY E. A. SCHWARZ, WASHINGTON, D. C.

The Great Salt Lake of Utah has been easily accessible for many years, and its shores have been visited by various entomologists ; so that

it seems strange that no one has hitherto published a comprehensive or even partial list of the insects occurring in that interesting locality. During the present summer, while on a short excursion to Utah with Mr. H. G. Hubbard, we had the opportunity of spending some time in the investigation of the insect fauna of the Lake. The larger portion of the insects collected by us, however, are not yet mounted, and still less determined, and the following remarks on our observations, which I venture to offer, are necessarily quite fragmentary and of a preliminary character.

The insect that, on account of the enormous number of individuals, cannot fail to attract the first attention of every visitor to the Lake, is a Dipteron of the genus *Ephydra*. Various species of this genus are known to occur in great number in salt water, and others occasionally become a nuisance in the vats and conduit pipes of salt-works. The particular species from the Great Salt Lake was first collected by Capt. Stansbury's expedition, and briefly noticed in 1852 by T. R. Peale in a letter appended to Prof. Haldeman's paper on the few insects collected by that expedition. Subsequently Dr. Packard (Am. Journ. Sc. and Arts, 1871, p. 105,) described the puparium and named the species *Ephydra gracilis*. The larva and imago still remain undescribed.

Along the sandy beaches of the ocean we usually find one or several windrows of seaweed cast up by the waves and marking the line of high tides. Similar windrows may be seen all around Great Salt Lake, but they consist exclusively* of the puparia of this *Ephydra*. The lake itself is full of floating puparia, which are gradually washed ashore, and if the breeze freshen and the waves get higher, the mass of puparia is pushed higher up the beach and forms a well-defined windrow, which can be plainly distinguished even on small photographs of any part of the lake shore. On June 13th, the most recent windrow (*i. e.* that nearest to the water), averaged nearly three inches in height and from four to five inches in width wherever the beach is sloping; at the rocky portion of the beach it was much higher, while on the flats the puparia are more spread out and form a kind of matting over the wet salt mud. Later in the season the accumulation of puparia became much greater. Investigation of the puparia on the day mentioned showed that most of them were alive, that only a small proportion had hatched, and that there was not a

*The dead bodies of various insects of other orders which have fallen into the Lake are intermingled with the mass of the Ephydras. Most of them are badly decayed, and the number of individuals and species thus found is very small.

single larva among them. On the sloping or rocky part of the beach the puparia rest upon dry ground and become themselves almost entirely dry. Here they remain for several days exposed to the warm sun, and it is certainly remarkable that under these circumstances they retain their vitality. ** From a tin box full of the puparia which I picked up on a dry spot on June 14th, the flies began to hatch by the thousands on June 19th. In the middle of June, the weather being rather cool, the imagos were not very abundant at the lake. They rest on the wet sand or on the rocks, and here, in the little pools between the rocks, we observed that the flies deliberately go under the water to a depth of two or three inches. Whether they do this for the purpose of ovipositing or of feeding on the algæ has not been ascertained. On June 25th the number of flies had already considerably increased, but on July 4th, when the little bathing establishment at Syracuse, on the eastern shore of the lake was visited, the number of flies was really alarming. On this point there are numerous shallow pools close to the lake beach, between the railroad dam and the dykes of the salt works, and the flies completely covered the edges and the surface of the pools, forming an unbroken coal-black mass. No observations on other insects would have been possible under these circumstances; but, fortunately, the flies could be driven away to some extent, and the roar of the rising flies is such as to drown the noise of the railroad trains passing close by.

The question where the larvæ of this *Ephydra* breed has not been fully settled by us. Numerous larvæ were found in the pools between the large stones near the famous Black Rock. They were still more abundant in the little sulphurous streams on the salt flats, thickly clinging to the slimy, thread-like algæ, upon which they probably feed. But all larvæ from these two sources account only for a small fraction of the prodigious number of puparia along the lake. It is evident that the majority of the larvæ must live in the open lake, where numerous reefs in shallow water appear to be favourable breeding places.

Whether the numerous crustacea (genus *Artemia*) that live in the lake feed on the *Ephydra* larvæ, or whether the sea-gulls and other birds so abundant on the salt flats feed on the puparia has not been ascertained; nor did we see any trace of the Chalcid parasite reported to infest the

**During calm weather the puparia must float for several days on the lake, and it would seem probable that the imagos are able to issue from the pupa on the surface of the water.

larva of *Ephydra riparia* in Europe. *Saprinus estriatus* is very abundant under and among the accumulated living puparia, and feeds upon them, while the larvæ of one or two species of *Dermestes*, which are also common at the same place, presumably feed only on the empty pupa shells. Very few other insects, and these only of small size (small Carabidæ, Staphylinidæ and Anthicidæ), are to be found among the puparia; but whether or not these feed upon the latter remains uncertain. A peculiar enemy of the imago fly was observed at Syracuse. Here, in the midst of the pools covered with the Ephydras, a commotion was occasionally observed as if a fish of considerable size had risen to the surface of the water. Mr. Hubbard succeeded in capturing one of these mysterious creatures, which proved to be the larva of a toad. It appeared that this tadpole comes to the surface of the water right among the Ephydras, with a dexterous motion of its tail sweeps a goodly number of the flies into its wide mouth, and retires again to the bottom of its ill-smelling abode. The toad itself, which was found by Mr. Hubbard deeply imbedded in the mud at the edge of the pools, is terrestrial and evidently nocturnal in its habits, but no doubt feeds also on the Ephydras.

Ephydra gracilis is the only insect that inhabits the open lake; but on the salt flats, where in many places the water of the shallow pools is more or less mixed with fresh or sulphurous water, various aquatic insects and insect larvæ can be found. There are here the larvæ of one or several species of *Tabanus;* a beautiful green Syrphid fly was seen to emerge from the wet mud. There are, further, the larvæ of several dragon flies at least half-a-dozen Dytiscidæ and Hydrophilidæ with their larvæ; and where there is a considerable admixture of fresh water the pools breed numerous mosquitoes and sand flies (*Ceratopogon*).

From what we saw on the beach of the lake and on the salt flats, a specialist in Diptera will find quite a number of interesting halophilous species. But we found it impossible to devote any time to this order, and all I secured was a specimen of a very peculiar slender Asilid, which was swiftly running over the mud, and seems to dislike to make use of its wing.

Next to the *Ephydra* in number of specimens comes the Heteropterous genus *Salda*, which is also well known to inhabit preferably the shores of the ocean and other bodies of saline water. What appears to be *Salda interstitialis* occurs in incredible numbers all over the salt flats

and renders the observation and collecting of other insects very difficult because, unlike the Ephydras, these Saldas cannot be driven away. The imagoes manage in course of time to get out of the way, but the ground remains covered with a multitude of jumping larvæ and pupæ. One or two other species of *Salda* occur among *S. interstitialis* but are much rarer, while the large *S. coriacea* occurred only among the sparse grass growing along the sulphur creeks. A very peculiar species of *Salda* (possibly forming a new genus) was never seen above ground, but lives nearly subaquatic on the underside of stones in sulphur springs or between the wet roots of the grasses growing close to the water. A genus of Heteroptera which we expected to see in great numbers at the lake is *Corixa*, but we were surprised to find only a few specimens of a single species (apparently *C. decolor*, originally described from Clear Lake, Cala.,) in the salt pools near Syracuse. It is possible, however, that they become more abundant later in the season. Various other Heteroptera found at the lake do not appear to be saline species, nor were there any saline Homoptera observed.

No Microlepidopterous larvæ were observed on the saline flora, but there are various species of Microlepidoptera feeding on these plants. None of them were reared; but it is possible that there are among them species peculiar to the Salt Lake reigion. As to the Orthoptera we were surprised at not finding anything that may indicate a saline species.* Some species of Odonata live in the sulphur creeks and some of the imagos were captured; but the same species were also seen at Utah Lake, which is fresh water.

The Coleoptera are best represented among the maritime and saline insects, and since most of our attention was devoted to this order, we found about 100 species in the immediate vicinity of the Lake, not counting those which were found drowned in the water, nor those which plainly belong to the desert fauna, of which quite a number of species

*On June 25th we found at the southern shore of the lake a considerable number of *Anabrus simplex* washed up by the waves and all badly decayed. Since we were unable to find a single living specimen of these gigantic crickets under stones, etc., anywhere near the lake we concluded that they must have bred on Antilope Island, situated about nine miles from the shore where the dead specimens were seen. But since my return from Utah I have read Dr. Aug. Forel's vivid account of the life-habits of the North African desert cricket, *Brachytrypus megacephalus*, which is a nocturnal species and lives on sandy soil in deep holes, which are closed up during day time by a billet of sand. *Anabrus simplex* has possibly similar habits, and we may, after all, have overlooked its abodes in dry, sandy places close to the lake.

frequent the lake beach. But just as at the ocean, not every species found on the beach is maritime, so at the Great Lake not all species found on saline soil are halophilous. In fact, saline soil seems to possess great attractions to many species, which usually live on the banks of fresh water lakes and streams. This holds especially true of most species of *Bembidium* which abound at the lake. Thus the number of true halophilous Coleoptera inhabiting the shores of Great Salt Lake probably does not exceed twenty-five distributed in the following families :—Cicindelidæ, Carabidæ (*Dyschirius*, *Pogonus*, *Bembidium*, *Tachys*), Staphylinidæ (*Aleochara*, *Homalota*, *Bledius*, *Thinobius*), Histeridæ (*Saprinus*), Chrysomelidæ (*Galeruca*, *Phyllotreta*), and Anthicidæ (*Notoxus*, *Mecynotarsus*, *Anthicus*, *Tanarthrus*). How many of these are peculiar to the Salt Lake* it is difficult to tell at present, where still so little is known of the geographical distribution and mode of occurrence of the smaller and less conspicuous Coleoptera. The species found by us will be fully enumerated in a list of the maritime and saline Coleoptera of North America which I am preparing. Of particular interest is the occurrence of a species of *Pogonus*, since this genus was hitherto known in America only from the ocean shore. Comparing the Salt Lake fauna with our maritime fauna, the most striking difference is the absence in the former fauna of Tenebrionidæ and Rhynchophora** which play such prominent role in our maritime fauna. *Cicindela hirticollis* and *Mecynotarsus candidus* appear to be the only species common to the Great Salt Lake and the Atlantic maritime fauna ; but both are not strictly maritime or saline species. A few other species (*Pogonus planatus*, *Bembidium ephippigerum*, and the genus *Tanarthrus*) are known to occur also in Southern California, either at the sea shore or at saline lakes, and this distribution seems to confirm the ancient extent of the Great Salt Lake to the extreme southwest of North America.

A number of aquatic beetles live in the sulphur springs and salt ponds contaminated with fresh water ; but, with the possible exception of a *Cœlambus*, they are all species common in fresh water. Phytophagous

*Most of the species found at the Great Salt Lake will no doubt occur also at Lake Sevier, in Southern Utah, which has never to my knowledge been visited by any entomologist.

**Tenebrionids of the genera *Eleodes*, *Coniontis* and *Blapstinus* are occasionally found at the Lake, but clearly belong to the desert fauna, while certain species of *Sphenophorus*, which abound at the roots of rushes, and a few other Rhynchophora are likewise not saline species.

Coleoptera are not numerous on the saline flora, but most of them occur also elsewhere. The large *Galeruca erosa*, which, when alive, is of a bright sulphur yellow colour, feeds with its larva on a species of *Sueda*, and is clearly a saline species, though not confined to the Salt Lake region.

Concluding this hasty sketch of the Salt Lake fauna, I would say that one of the reasons why so little of this fauna has hitherto been recorded, is that most presons coming from Salt Lake City visit the lake only at Garfield Beach, which is at present the most readily accessible point of the south shore. But just at this spot the saline fauna is but poorly represented, and, moreover, the desert flora and fauna come here close to the lake. The immense salt flats which commence about one mile from Garfield Beach are rarely visited; but here is the home of the genuine salt fauna. Collecting in the semi-fluid and ill-smelling salt mud of these flats is, however, somewhat troublesome, and it would be no easy matter to bring together a complete set of the various species. Fortunately, however, the entomologist finds here assistance in an unexpected way. There are several large salt works on these flats, where numerous large, shallow ponds have been excavated for the purpose of gaining salt by the evaporation process. If there is no water in these ponds, the bottom consists of a tenacious, loam-like mud, saturated with concentrated brine, and here concealed in this mud some of the most characteristic species of the Great Salt Lake fauna *(Pogonus planatus, Dyschirius salivagans, Bledius, (3 species,) Tanarthrus salicola,)* can be found in great numbers of specimens.

Mr. Smith gave some

NOTES ON THE FOOD HABITS OF XYLEBORUS DISPAR.

In the latter part of June while collecting along a road, he noticed that many of the young willows and birches on one side of the road were dead. Investigation showed that in the main stem, usually about three feet from the ground, a colony of Scolytids were boring. At this time there were a few larvæ, more pupæ, but a yet larger number of newly matured beetles. The galleries were longitudinal, and up or down from a main transverse and somewhat irregular central channel, which had an opening through the bark. This gallery so weakened the stems, which were from one-half to one inch in diameter, that they would readily break. In some cases where all the insects were in the imago state all the longitudinal galleries were full of beetles, all headed toward the blind end of

the gallery, the head of one close to the tail of that preceding. The remarkable feature was in the disproportion between the sexes in appearance and numbers. The male was very small as compared with the female, and much more rounded, almost globose. The males, too, were much less numerous than the females; usually there was only one in a gallery, and he was usually at the extreme end. Mr. Schwarz has determined the species as *Xyleborus dispar*. The species has been injurious to pear, but Mr. Smith was not aware that in America it had been recorded from either birch or willow.

Mr. Schwarz was not surprised at this record, because in Europe *X. dispar* eats almost anything, being found in most widely divergent plants. In America it has been reported on pear, apple and liriodendron.

Mr. Fletcher said the species was very injurious to pear and apple in Nova Scotia, but he finds both sexes almost equally abundant, and sometimes entire galleries filled with males only.

Mr. Schwarz said that in this particular group of *Xyleborus* (genus *Anisandrus*, Ferrari), the males are usually much rarer than the females. They are wingless and never leave the burrows, copulation taking place within them. Seven North American species are known to him, but only three in both sexes, and none of the males of our species have ever been described by American authors. He added that *X. obesus*, Lec., would in all probability prove to be identical with *dispar*, the latter being variable in size, according to the nature of its food-plant.

Mr. Smith then gave a note on the

HABITS OF VOLUCELLA FASCIATA.

A lot of prickly pear was received from Ocean County some time in May or June, infested by a Lepidopterous larva which proved to be *Megaphycis bollii* or *Melitera prodenialis*, already referred to by Mr. Riley. The larvæ were counted and the leaves cut so as to make sure of their contents; but at that time nothing was noticed of any other insect. Later the caterpillars pupated, and eventually a moth appeared for every known larva. A few days after a Dipterous pupa was noticed in the jar which had been left undisturbed, and eventually some 8 or 10 Syrphid flies made their appearance. They could not have been parasites for all the Lepidopterous larvæ were accounted for, and I can only suppose that either eggs or very small larvæ were in the partly decaying flesh of the infested leaves and these were overlooked because not expected. Com-

paring the specimens with the typical collection in the U. S. National Museum, they agree in all respects with *Volucella fasciata*, heretofore not recorded north of North Carolina. In his monograph, Dr. Williston in the review of larval habits as far as known, gives *Volucella* as parasitic in the nests of bumble bees. This, therefore, adds not only a new locality, but some positive information on the habits of one of the species of *Volucella*, which is certainly not parasitic and has no connection with bumble bees.

Mr. H. E. Weed made some remarks on

THE NATURAL HABITAT OF THE SCREW-WORM.

The life-history and habits of this insect, *Compsomyia macellaria*, have been given in full in recent bulletins published by the Texas, Louisiana and Mississippi Experiment Stations. A review of the literature is not necessary here, and it suffices to say that it is generally supposed to have its natural habitat in living animals.

It has been well known for some time, however, that the insect also passes through its transformations in dead flesh and decaying vegetable matter. Many observations made this season led him to conclude that the insect's natural habitat is dead flesh, as is the case with many others of the *Muscidæ*.

A visit to any slaughter-house in Mississippi at this season will reveal the larvæ in very large numbers among the refuse matter thrown out. The flies may be seen ovipositing or resting upon weeds or flowers in the immediate vicinity. He has taken them by the thousands in sweeping the weeds and bushes with a net.

At the college, this year, he has collected the flies and knows of no case of screw-worm in that part of the State. If there were cases in live animals he is quite sure they would have been reported. But few cases of screw-worm have been known this season in the southern part of the State, although flies are present in large numbers. It seems probable, therefore, that the occurrence of this insect in living flesh is exceptional rather that the rule.

Mr. Mann had not seen Mr. Weed's report, but had believed that eggs were laid in wounds of animals, not in healthy tissue.

Mr. Weed said eggs were often laid in wounds, and especially where ticks had been killed on the skin, so causing a clot of blood.

On motion, the Club adjourned till 1 p.m.

AFTERNOON MEETING.

The club met pursuant to adjournment at 1 p.m., President Osborn in the chair, twenty-two persons present.

Mr. Hudson spoke

ON ELECTRIC LIGHT COLLECTING AT PLATTSBURGH, N. Y.

The season at Plattsburgh often opens in February with *Homoglaea hircina* and *Xylina laticinerea*. Many rarities occur in March. Moths will fly at a temperature of 36° Fahr. The first Bombycid to appear is *Gluphisia lintneri*, early in April, *Smerinthus cerisyi*, *Phragmatobia assimilans*, *Ellida gelida*, *Audela acronyctoides*, *Feralia jocosa*, *F. major*, *Momaphana comstocki*, *Xylomiges dolosa* and many other extremely rare forms are to be obtained through such early collecting. The lamps give quarts of material which, though usually somewhat rubbed and torn, is of great value to the student for anatomical purposes, and, besides, furnishes material help in making out an important part of their life histories. Many orders are taken besides Lepidoptera. Many economic questions arise, such as the effects of this wholesale slaughter on the perfecting of fruits and seeds of plants depending to a great extent on night-flying insects for cross fertilization. Many insect allies, such as parasitic hymenoptera, aphis-eating insects, land and water scavengers, etc., are daily destroyed. What will be the effect of this new destructive force thrown on one side of a shifting balance already existing? Mr. Hudson showed types of two new Ptilodonts, *Gluphisia avimacula* and *Cerura modesta*, descriptions of which will soon appear. Much new material awaits any worker who will collect both early and late in the season. In nearly all genera of Lepidoptera, the males are much more frequently taken at the electric lights than the females.

Mr. Osborn agreed that even poor material was often most valuable for study purposes.

Mr. Smith commended the practice of early collecting. Experience has proved that some of the rarest forms in collections were scarce, only because they had disappeared when collecting began. He has this spring received from Mr. Dyar a lot of material collected at light in Manitou, Colorado, containing some supposed rare forms in great numbers, and some new species as well. The insects were nearly all poor, but valuable for study for all that.

Mr. Doran was rather interested in the idea of *early* collecting. In Tennessee he collected all the year round, and each season furnished something characteristic.

Mr. Fletcher asked whether the lights do not lose their attraction to insects after a time, and stated that such had been his experience at Ottawa where the insects had become largely accustomed to the light and were not nearly so much attracted as at first.

Mr. Hudson had found this so in Plattsburgh. Insects were very much less abundant now than when the lights were first started.

Mr. Schwarz had found that certain lights exercised a superior attraction year after year, and that they were now as good as they ever had been. He could never understand the reason why a certain light should be so attractive as compared with others immediately surrounding it, and apparently as favourably located. He did not think the fauna was much influenced by the specimens killed at lights. He was surprised to find, last June, that Salt Lake City, Utah, seemed to have no electric light fauna ; but this might be seasonal.

Mr. Smith thought it was certainly seasonal, for the late Mr. Henry Edwards had made quite an interesting collection of Lepidoptera at that point, almost all of them at the lights.

Mr. Smith, using the proof sheets of his new list as a text, made some

REMARKS ON THE CLASSIFICATION OF THE LEPIDOPTERA.

An order that is so general a favourite with collectors might be assumed to be well studied and well systematized. And yet that is exactly what the Lepidoptera are not. Characters for use are abundant, and excellent work has been done in certain groups ; yet save Herrick-Schæffer, no one has ever proposed a consistent classification of the entire order. In America such a work has been impossible from a lack of material, and the Herrick-Schæffer classification has proved too one-sided with the accumulation of new material. The order has also suffered from the large number of amateurs and superficial workers who describe an insect as belonging to a certain family or genus because it looks so, but who have not the remotest idea of the characters that really determine classification. The result when it is undertaken to arrange our species systematically, is startling, and the student soon learns that he cannot rely upon either generic or family references. There has been no system in the use of

group terms, and many so-called families are absolutely incapable of definition. A great many questions come up for settlement in the preparation of this list of Lepidoptera. Besides the editing, my work has been confined to the macro-heterocera as far as the Geometrina, and on the families there embraced a few remarks are made as explanatory of my views on the subject.

The *Sphingidæ* are well limited, and the classification is probably on a tolerably sound basis, yet there are two very distinct series that are probably independent branches from the original Bombycid stock. The *Smerinthinæ* now have their nearest allies in the *Ceratocampidæ*, while the *Sphinginæ* have their allies with the *Notodontidæ*. The *Sesiidæ*, which custom has placed immediately after the *Sphingidæ*, have nothing whatever to do with them. They are different in all stages, and save for a superficial resemblance in the imagines, there is no relation whatever. They should be associated with the *Cossidæ*, from which they are to-day very distinctly separated; yet, besides the larval habit, the imagos in many of the Sesiid genera have real Cossid affinities.

The *Thyridæ* are few in number, and the family is well marked.

Under the term *Zygænidæ* a most heterogenous mass has been usually classed. I long ago pointed out that none of our American species had the structural characters required by the definition of the family, and that the family, so well represented in Europe, is totally unknown in boreal America. I have, therefore, split up the series into compact groups, with family appellations.

The *Agristidæ* perhaps do not deserve to be called compact, and possibly part of the series may yet be transferred to the *Noctuidæ*.

The *Syntomidæ* are very well limited, but only feebly represented with us; nor have we many of the more typical forms, most of them resembling in appearance more nearly the *Pyromorphidæ*. The latter family is also small, well defined, and nearest to the next, the *Ctenuchidæ*, also a well limited group. The *Pericopidæ* form a natural lead into the *Arctiidæ* and *Lithosiidæ;* and, indeed, beginning with the *Syntomidæ* and running through the *Arctiidæ*, we have a fairly natural group. The *Pericopidæ*, are known to me only in the American species, and the family reference is by Mr. Hy. Edwards.

Three genera, which are probably related, are placed in the *Heterogynidæ*. This is also done on Mr. Edwards's authority, and I do not

believe that any of the genera belong to the family to which they are referred. I have not had specimens for study, and cannot say anything positively.

The *Nycteolidæ* are fairly well defined, and close relatives to the *Lithosiidæ* which follow them. This family as a whole is closely allied to the *Arctiidæ*, the presence of the ocelli only separating them.

The *Liparidæ* begin a new series of Bombyces, and the family is a fairly distinct one.

The *Limacodidæ* have been in considerable confusion; but Mr. Dyar's work promises to let in some light. In the larval state at least they were well distinguished.

The *Psychidæ* are also fairly well limited.

The *Dioptidæ* contain only a single species, referred to the family by Mr. Grote. The reference is at least questionable, and I assume no responsibility for it.

The *Notodontidæ* are quite well represented in our fauna, and are the most noctuiform of the Bombyces. The place given them in the series is a little open to question; but not more so than in several other cases. Generic references here are very unreliable.

The *Platypterygidæ* are tolerably well limited, and not numerous in species with us.

The *Saturniidæ* I have treated monographically, and they make a very well defined family.

The *Ceratocampidæ* have many points of similarity with the *Saturniidæ* and are as sharply defined. We strike here what I consider quite an ancient type.

The *Bombycidæ* have *Bombyx mori* as type, and possibly two sub-families are indicated in the series as associated.

The *Cossidæ* and *Hepialidæ* are both very well limited, while no more related to each other than to the Sesiidæ.

Under the term *Noctuina* I have united the *Thyatiridæ*, *Noctuidæ* and *Brephidæ*. The Noctuidæ are a very complete family, in which several quite distinct types seem combined. I have not been able to find any satisfactory line of division for sub-families, and the groupings proposed by Mr. Grote are too unequal in value and too entirely indefinable for adoption.

Mr. Mann thought the division into families a decided advantage, not only from the systematic standpoint, but also from the bibliographical point of view. It much facilitated reference making and indexing and the groups could in all respects be dealt with more satisfactorily.

The following paper was then read by its author :—

LONGEVITY AND VITALITY OF ARGAS AND TROMBIDIUM.

BY MARY E. MURTFELDT.

It seems incredible that creatures as highly organized as the ticks and mites should be able to live for months and even years without food, and, in the case of some of the former, are capable of surviving even a prolonged immersion in a somewhat acrid fluid.

As an illustration of this remarkable vitality I wish to call attention to the case of two species that have come under my observation during the past year.

About the middle of April last I received from a correspondent a specimen, probably about two-thirds grown, of a species of cattle tick, determined for me by Dr. Riley as *Argas reflexus*, and supposed by him to be found only, or usually, on pigeons.

This creature had been inclosed loosely in the folds of the letter of inquiry, and the pressure in the mail bags, or perhaps the postmaster's stamp had completely expressed its sanguinary contents which were smeared over the paper. The tick, however, though almost as flat as a sheet of paper, was very much alive, and, with the intention of making some experiments upon it, it was placed in a small bottle from which alcohol had been hastily rinsed, but which was not thoroughly dried.

Here it was suffered to remain for a week or ten days without further attention. At the end of this time, happening to think of it, I found it immersed in the moisture which had collected in the tightly closed bottle, which, by the combination of the water and alcohol, had become a fairly strong vinegar. To my surprise upon shaking the tick out upon a blotter I found it apparently none the worse for its acid bath. With a view to test its powers of endurance still further it was then placed in a small, tight tin box in which was a layer of dry sand and a bit of oak leaf.

Under these conditions it still survives. A fresh bit of vegetation is occasionally introduced into the box, but there is no evidence that the

Argas makes any use of these leaves ; it neither increases nor diminishes in size, nor has it, as yet, moulted, although under such conditions the latter was to have been expected. Very similar to the above was the case of a specimen of the large and beautiful scarlet *Trombidium sericeum*—an egg parasite of *Caloptenus spretus*. A number of these mites were sent to me by a lady who had received them from Texas. They were put into a glass jar upon an admixture of sand and garden soil. Some young locusts were also placed in the jar as food, since I was not able to obtain egg pods of the latter. None of the mites, however, seemed to feed, and in the course of a month or six weeks all the smaller specimens had perished. One, however, that was considerably larger than the others, was found to have buried itself in the earth, and when turned out seemed to be perfectly healthy and not in the least shrunken. Upon being restored to the jar it at once burrowed into the earth, tunneling to the bottom.

In this way, hidden from sight, except as I turned it out about once a month, it survived, without food, until the following December, when, the temperature having fallen quite low in the room in which it was kept, it succubmed to cold and perished.

It was stated that Dr. Riley had kept a specimen of this tick alive without food for seven years, and that during that time it had repeatedly moulted.

Mr. Mann stated that he had kept a bombycid larva without food for ten weeks. It did not moult during that period.

Dr. Marx stated that *Argas* breeds also on cats and dogs as well as cattle, and is not confined to pigeons. He showed by blackboard sketches how, when some of the ticks are full fed, the family characters become obscured. Where the head is normally retracted under and concealed by the dorsal surface, when gorged with blood, this character disappears, and it is hard to distinguish them from the *Ixodidæ*.

Mr. Smith stated that he then had a *Trogoderma* larva alive in a vial closed with a rubber stopple, in which it had lived without food for more than a year. At irregular intervals it moults, but does not seem to change much otherwise, and does not eat the cast skins.

The following paper was read by the Secretary :—

NOTES ON TWO BORERS INJURIOUS TO THE MOUNTAIN ASH

BY D. S. KELLICOTT.

In the late publication of the Department of Agriculture on "Forest-tree Insects" three species are mentioned as affecting the trunk of *Pyrus americana*, viz: The round and flat-headed apple-tree borers and an unknown longicorn larva. I have recently found two additional species fully as injurious as those mentioned. These are *Podosesia syringæ* and *Zeuzophora semifuneralis*. The former is a well-known Ægerian, usually destroying the lilac and white ash; it occurs in far too great abundance in both these plants at Columbus.

In April last the mountain ashes on the Campus of the State University were discovered to be suffering from insect attacks, and search soon disclosed scores of round openings leading into the wood, each guarded by a thin shell of the outer bark; these occurred from near the ground to the branches, and in a few cases among the branches. The knife easily uncovered a pupa in the boring, and the nature of the insect was at once foreseen. The distributions of the openings led me to think that here was a case in which an Ægerian larva had directly penetrated the uninjured bark, but by cutting away the wood sufficiently I soon found that they had entered originally at the borders of scars and irregularities caused by some other agencies; that in their long, larval imprisonment they had burrowed up and down the stem for sufficient distances to thus generally distribute the places of exit.

The first imago appeared April 28, and by May 10 all were out. In no case were they seen to emerge later than 12 m.; nearly all did so between 8 and 10 a. m. of sunny days. Oviposition was observed to take place in the afternoon as a rule, and the eggs were laid about the edges of wounds and deformities.

Prevention, therefore, is not difficult; sound trees practically have immunity; in case of injury some of the usual means of protection should be resorted to. The pupæ may also be destroyed with a wire or by other means. In a few instances ants were seen attacking and destroying them.

The second species mentioned is a Phycid and really does more injury than the Ægerian. In April and May numerous loose, white cocoons were found under bark loosened evidently by the action of the larvæ preceding them. Early in May the moths appeared, escaping in

the afternoon. The first week in August larvæ were found mining under the bark, and evidently of this species; whether they are to mature and pupate this fall or defer this important change until spring remains to be seen.

The identification of the species was by comparison with examples in the National Museum. One of the specimens in that collection has a note written upon the label stating that it was taken from under the bark of the persimmon. I have also taken pupæ and cocoons from under the bark of the black cherry which appear to be identical. Imago not seen.

Mr. Smith then made some remarks

ON THE SPECIES OF CUCULLIA.

He had just completed a revision of the species with plenty of good material, and had found the species not difficult to separate. They are very closely related, and very constant, so that comparatively small characters are constant. A large amount of material from Colorado developed the interesting fact that there was a series of western species equal in number and parallel with an eastern series, and that as a whole each series differed more than the individual species did themselves. Thus far he does not know a single species found on both sides of the continent, while, besides this parallel series, each side has an oddity or two.

Mr. Schwarz said that parallel series of eastern and western species, such as described by Mr. Smith, were not rare in the Coleoptera, and asked whether in this scheme Texas was eastern or western.

Mr. Smith said neither series occurred in Texas, which had a species peculiar to itself and Arizona, and in answer to Mr. Ashmead, he said the nearest allies of the European species appeared in the western series.

Mr. Smith also made a few remarks on

STAINING INSECT TISSUES.

He had found considerable trouble in his studies in differentiating parts, and especially those structures that tend to become transparent. After considerable experimentation he had found *nigrosin* one of the most satisfactory stains for trachea and glands, and many of the membraneous structures. It does not touch chitine. By the use of this stain he had followed the trachea to the tips of antennæ and into the labella of flies. Saffronin is another valuable stain, and especially for chitinous structures, for which it seemed to have a special affinity. Combining

nigrosin and saffronin often gives very pretty results. Care should be exercised not to leave the objects in the saffronin too long, as it is apt to result in a uniform and too intense colour, which is hard to get rid of. Hæmatoxylin gave very poor results, and he does not look on it with favour. Eosin is excellent where only a slight stain is desired, and has given some beautiful results. The use of such methods in studies admitting of them will solve many problems that are still obscure.

Mr. Osborn commented on the importance of such methods and endorsed Mr. Smith's suggestion as to their desirability.

Mr. Fletcher then gave some

NOTES OF THE YEAR IN CANADA.

Apple pests had been more abundant than usual. Of these the Eye-spot bud-moth had been most often complained of, webbing up the flowers and young foliage and boring down the flowering spurs. At the same time the larvæ of *Teras minuta* and *Cacœcia rosaceana* occurred also in injurious numbers in many localities. Canker-worms had done considerable damage in some localities. Paris green had been successfully used for all the above. The canker-worm had attacked the Ash-leaved maples *(Acer Negundo)* in the streets of Winnipeg and at Brandon, Man. Cut-worms were not very abundant, but the larvæ of *Agrotis ochreogaster* or *A. turris* (both forms having been bred from the same larvæ), were destructive to almost all kinds of vegetation up to the middle of July. A feature of the year had been the enormous numbers of all kinds of plant bugs. Two of his most interesting observations were the breeding of a small weevil from oats which had been identified by Mr. Schwarz as *Macrops porcellus.* He had also bred it from the young stems of *Panicum Crus-galli,* and had succeeded in breeding one parasite. It bores in the stem just above the root. An account was also given of a serious outbreak of an imported saw-fly, *Fenusa melanopoda,* which for three years had entirely spoilt the appearance of the European alders upon the grounds of the Experimental Farm at Ottawa. The native species growing near these trees was not injured. There are two broods in the year, perfect flies appearing in June and July and September. Belated larvæ had been found in the leaves as late as Oct. 19th. The larvæ are leaf-miners, and there are sometimes 15 or 20 mines in a leaf. The mines are at first separate, but after a time run together, and the larvæ all live together, frequently consuming nearly the whole of the parenchyma of

the leaves. The perfect insect is a small black saw-fly about ⅛ inch in length.

Nematus Erichsonii, the imported larch saw-fly, was stated to have done enormous damage in Canada. Thousands of acres of American larch having been killed by the attacks of the larvæ.

Mr. Ashmead in comment stated that *Fenusa* is also found on the alder in Europe, and that he has no doubt it is the same species bred by Mr. Fletcher.

The Club then adjourned till 9 a. m. of the 22nd.

AUGUST 22, 1891.

The Club met at 9 a. m., President Osborn in the chair, 19 members present.

The minutes of the morning meeting of the 21st were read and approved. On motion of Mr. Mann the Secretary was authorized to make up the minutes of the afternoon meeting, and to publish the same after submitting to the speakers the report of their remarks, if deemed necessary.

The following communication from Mr. Wm. H. Seaman, 1424, 11th Street, N. W., Washington, D. C., was read by the Secretary :—

" Having engaged in an investigation of the structure of the Photogenic organ of our common fire-fly, *Photuris pyralis*, which will be published in the proceedings of the American Microscopical Society in about two months, I would solicit information as to the habits of these insects not now in print, and especially on the following points :—

' Fire-flies are very numerous on the Lower Mississippi. What is the most common species there ?

' What is the most numerous species on the Pacific Coast ?

' Are the eggs luminous ?

' Do the insects lighten on returning to the ground as much as on rising ?

' Do the sexes, where both are winged, seek each other on the tops of trees or exclusively on the ground ?' "

Mr. Claypole spoke on

A METHOD OF PRESERVING LARVÆ FOR CLASS USE.

He spoke of the constant care necessary to prevent evaporation of

alcohol, and the trouble with corks in general, and advocated sealing in a glass tube half filled with alcohol, or the alcohol could be entirely omitted after the insect had been killed in it, and the specimen would be free and easily studied. Specimens illustrating the method were exhibited. He seals his tubes with a blow pipe, making a sharp flame, and in this way a vial even three-quarters full of alcohol could be closed readily.

He also spoke of

A CHEAP SUBSTITUTE FOR CORK.

Cork for lining insect boxes is expensive, and he has found that soft pine, cut across the grain, formed a good and cheap substitute

Mr. Osborn said Dr. Packard had also advised sealing vials containing larvæ. Where no alcohol was added it was of course necessary that the specimens be perfectly hardened. The wood to be substituted for cork must be very soft and even.

Mr. Smith said it would be very difficult to get material so free from resin that a paper covering would not be stained.

Mr. Mann said strawboard and a frame covered with paper had been suggested as substitutes for cork.

Mr. Webster said corrugated paper was very convenient for some purposes.

Mr. Claypole said all forms of strawboard or paper failed for want of elasticity in the material. Cork and wood are elastic and clasp the material firmly.

Mr. Smith said this was the objection to turf, which was otherwise a very satisfactory material.

Mr. Mann uses no lining of any kind in his boxes. He thought the pita-wood, formerly imported by him about as good as anything, and thought it could be brought in quite cheaply.

Mr. Smith said that even pita had its hard streaks, and that while generally excellent, it was not sufficiently uniform. On a small scale, for study boxes, corn pith was not bad.

Mr. Fletcher said the lower part of the stems of *Typha latifolia* is still better; but the compressed cork now on the market is sufficiently cheap, and is excellent.

Mr. Ashmead said that in the Berlin Museum they often preserved different stages of an insect in small tubes inclosed within a larger tube.

Mr. Fletcher spoke of his experience with the acetic acid mixture, recommended by Mr. Smith at Champaign last year. He found the mixture of equal parts, alcohol and acetic acid, not the best proportion, and had added 25 per cent. distilled water with good results. He exhibited a number of specimens in this liquid, perfect in colour and shape. For white larvæ he finds it especially good, preserving form and colour perfectly. In response to a question by Mr. Doran, he said the mixture was cheaper than alcohol alone.

Mr. Marlatt asked whether the mixture was not corrosive to the skin where it was freely used.

Mr. Smith replied that where the mixture contained less than 50 per cent. of acid it was harmless. Where the skin was broken it caused an itching or burning ; but clear water readily cured that.

In answer to a question by Mr. Mann, he stated that the evaporation was not so great as with alcohol alone ; but that there was a tendency to attack cork stopples. It does not touch rubber. The advantage in the acid was its effect in preserving form, preventing the shrivelling effect of the alcohol. The insects were just as good for study and the internal organs preserved as well as in alcohol. In reply to a question by Miss Claypole, he said that for spiders it was excellent.

Mr Fletcher asked whether anyone had used Carbolic Acid as a preservative. He had been asked to collect butterfly eggs and to preserve them in strong carbolic acid.

Mr. Mann has used a very weak solution satisfactorily, and has found that there is very little or no evaporation of the liquid.

Mr. Howard asked whether the acid had any staining effect, and Mr. Osborn whether it did not shrivel material.

Mr. Smith had never noticed any staining effect. He uses the acid to clear specimens previous to mounting in balsam, and some material gets no other treatment save a soaking in the acid. He finds that it renders tissue transparent, and that a katydid placed in the strong acid became uniformly glassy so that it could be almost seen through. It stained no part of the internal structures. Removed from the acid and placed in alcohol the insect gradually became opaque as before. It does not seem to shrivel and does not destroy very rapidly as far as his experience goes.

Mr. Claypole said it had a bleaching effect.

Mr. Riley exhibited specimens of *Megaphycis bollii* in all stages, and made some brief remarks on the life habits of the species, which he was led to do by the fact that Mr. Smith had recently bred it from prickly pear in New Jersey. His own specimens had been bred from the fruit of Opuntia in Florida, first received in 1877 from Mrs. Mary Treat, of Green Cove Springs, Fla., and subsequently from Mr. H. G. Hubbard, Crescent City, Fla., in January, 1883. He had had the species marked with the MSS. name *Myelois opuntiella*, and had had engravings made of all stages for many years; but as he had learned in 1882 that the insect had been described as *Metitera prodenialis* by Walker, he had never published his description, and the species was subsequently named as *Megaphycis bollii* by Zeller. According to the law of priority this last name, both generic and specific, would have to give way to Walker's. The breeding of this species in New Jersey gave it a more northern range than had been hitherto recorded.

As a supplement to the paper which was expected from Mr. Lintner, he further exhibited a box containing specimens of ♂ and ♀ *Phengodes laticollis* and *Zarhipis riversii*, and called especial attention to the larviform females.

He also called attention to the fact that in connection with Mr. Pergande, he had been of late making special collections and observations of *Phylloxeræ* at the request of Mr. Dreyfuss, who was preparing an elaborate work on them. He had found many interesting new forms and many facts that were new concerning the habits of the gall-makers on hickory. He had also found an interesting species on willow and *Nyssa*, and stated that the hickory species are much more numerous than had been supposed.

He also exhibited a box of specimens, with drawings, illustrating the life habits of *Sphecius speciosus*, which had not been previously recorded. The egg and several larval stages were shown in the specimens. One of the most interesting features is in the cocoon. There is a median band lined with silk, containing curious circular perforations which have the appearance of minute tubes reaching the exterior of the walls of the cocoon with a sort of rim, recalling in appearance stigmata. He was obliged to leave without going into further details, but hoped for an expression of opinion from others as to the object of these peculiar perforations.

Mr. Marlatt, who had assisted Mr. Riley in his work on this insect, described more particularly the structure of these perforations, illustrating by blackboard sketches. They are really distinct tubes of a gutta-percha-like appearance and consistency and differing entirely in texture from the remainder of the structure. Inwardly they were closed by a layer of silk so that they really did not perforate the entire cocoon.

In response to a question from Mr. Wallace he stated that he did not think any commercial use could be made of the cocoon.

Mr. Schwarz commented on the present state of our knowledge in the *Phengodini*. We do not know what is a species in *Phengodes*, and probably too many names exist. Of *Zarhipis* we have four named species, which must be reduced to two, *integripennis* and *ruficollis*, the latter including *riversii* and *piciventris* as colour varieties. Of several eastern species of *Phengodes* it is difficult to get specimens of the male, and we do not even know the male of the species occurring in Maryland and the District of Columbia. Prof. Riley has the only collection containing the larviform females of several eastern species of *Phengodes*; but only one of these, *laticollis*, has been connected with the males.

Mr. Mann asked whether not more than one species existed in Massachusetts. He has described in Psyche three forms of larvæ or females that he collected in that State.

Mr. Schwarz replied that he had never seen a male *Phengodes* from Massachusetts; but there was probably only a single species. The three different forms of luminous larvæ described by Mr. Mann may be satisfactorily accounted for by supposing one to be the larviform female imago, the second the larviform pupa of the female, and the third the larva of the male.

On motion the Club adjourned to meet again under the rules at the next meeting of the A. A. A. S.

J. B. SMITH, Acting Secretary.

ANNUAL MEETING.

The annual meeting will be held in London at the Society's rooms, Victoria Hall, on Wednesday, 25th Nov. All are invited to attend and contribute papers.

Mailed October 31st.

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VOL. XXIII. LONDON, DECEMBER, 1891. No. 12.

LIST OF WRITINGS OF THE LATE HENRY EDWARDS.

BY WM. BEUTENMULLER, NEW YORK.

The present list of writings of the late Henry Edwards was compiled up to 1880 by the deceased, and the titles following were added by me. Mr. Edwards, at the time he gave me the list, told me that it lacked the titles of one or two articles he had written for some newspaper in Australia a number of years ago, but could not remember on what subject they were, nor in what paper he published them. His papers on Pacific Coast Lepidoptera, Nos. 23 to 30 inclusive, were not published by the California Academy of Sciences, except as author's extras. I am informed that at that time (1877–78), by reason of the lack of funds, the Academy published nothing, and that while Mr. Edwards was in San Francisco the last time, there was some talk about publishing these papers in the Proceedings of that Society. We hope that this will soon be done, as the limited number of these papers that were printed have all been distributed by Mr. Edwards, and undoubtedly before long will be almost inaccessible to anyone not possessing a copy, and ultimately they will become lost from view altogether, if not placed on permanent record.

1871.—Notes on an extended Entomological tour made by Lord Walsingham. (Alta. Calif. June–Aug.)

1873.—Notes on Honey-making Ant of Texas and New Mexico. *Myrmecocychus Mexicanus*, Westw. (Proc. Cal. Acad. Sc., V., p. 72.)

Republished, Pacific Rural Press, May.

Republished, Am. Naturalist, VII., pp. 722–726.

1873.—Pacific Coast Lepidoptera, No. 1.—Descriptions of new or imperfectly known Heterocera. Proc. Cal. Acad. Sc., vol. V., pp. 109–113.

1873.—Pacific Coast Lepidoptera, No. 2.—On the transformations of Diurnal Lepidoptera of California and the adjacent districts. (Proc. Cal. Acad. Sc., V., pp. 161–172.)

1873.—Pacific Coast Lepidoptera, No. 3.—Notes on some Zygaenidæ and Bombycidæ of Oregon and British Columbia, with descriptions of new species. (Proc. Cal. Acad. Sc., V., pp. 183–196.)

1873.—Remarks at the Agassiz Memorial Meeting, Mercantile Library Hall, San Francisco, Dec. 22, 1873. (Proc. Cal. Acad. Sc., V., p. 241.)

1874.—Scientific Notes. (Overland Monthly, 13, pp. 193, 285, 379, 484, 572.)

1874.—Pacific Coast Lepidoptera, No. 4.—Descriptions of some new Genera and species of Heterocera. (Proc. Cal. Acad. Sc., V., pp. 264–267.)

1874.—Description of Cynips saltatorius, Hy. Edw. (Pacific Rural Press).

1874.—Pacific Coast Lepidoptera, No. 5.—On the earlier stages of some species of Diurnal Lepidoptera. (Proc. Cal. Acad. Sc., V., pp. 325–332.)

1874.—Pacific Coast Lepidoptera, No. 6.—Notes on the earlier stages of Ctenucha Multifaria, Boisd. (Proc. Cal. Acad. Sc., V., pp. 344–345.)

1874.—Pacific Coast Lepidoptera, No. 7.—Descriptions of some new species of Heterocera. (Proc. Cal. Acad. Sc., V., pp. 365–367.)

1874.—A tribute to the memory of George Robert Crotch. (Proc. Cal. Acad. Sc., V., pp. 332–334.)

1874.—Pacific Coast Lepidoptera, No. 8.—On the transformations of some species of Heterocera not previously described. (Proc. Cal. Acad. Sc., V., pp. 367–372.)

1874—Pacific Coast Lepidoptera, No. 9.—Description of a new species of Thyris, from the collection of Dr. Hermann Behr. (Proc. Cal. Acad. Sc., V., p. 413.)

1874.—Pacific Coast Lepidoptera, No. 10.—On a new species of Papilio from California. (Proc. Cal. Acad. Sc., V., pp. 423–424.)

1875.—Pacific Coast Lepidoptera. No. 11.—List of the Sphingidæ of California and adjacent Districts, with descriptions of new species. (Proc. Cal. Acad. Sc., VI., pp. 86–94.)

1875.—Pacific Coast Lepidoptera, No. 12.—On some new species of Noctuidæ. (Proc. Cal. Acad. Sc., VI., pp. 132–139.)

1875.—On the localities and habits of the various species of Omus. (Psyche, Vol. I, pp. 73–76.)

1875.—Notes on a Cochineal-bearing insect of California (*Coccus arctostaphylos*, Hy. Edw., MS.) (San Francisco Micro. Soc.)

1875.—Pacific Coast Lepidoptera, No. 13.—On the earlier stages of Vanessa Californica. (Proc. Cal. Acad. Sc., VI., pp. 146–149.)

Republished in the San Francisco Evening Bulletin, July, 1875.

1875.—Darlingtonia Californica, Torrey. (Proc. Cal. Acad. Sc., VI., pp. 161–166.)

Republished in the San Francisco Evening Bulletin, Sept., 1875.

1875.—Note on Sarcodes Sanguinea, Torrey, (Snow Plant of the Sierras). (San Francisco Evening Bulletin.)

1875.—Pacific Coast Lepidoptera, No. 14.—Notes on the Genus Catocala, with descriptions of new species. (Proc. Cal. Acad. Sc., VI., pp. 207–215.)

1875.—Pacific Coast Lepidoptera, No. 15.—Description of a new species of Catocala from San Diego. (Proc. Cal. Acad. Sc., vol. VI., pp. 184–185.)

1876.—Annual Address as Vice-President of the California Academy of Sciences. (Proc. Cal. Acad. Sc., VII., pp. 1–10.)

1876.—Notes on the Sugar-Cane Weevil, Sphenophorus Sericans, Wied. (San Francisco Micro Soc., p. .)

1876.—Notes on Exodes from South California. (Pacific Rural Press.)

1876.—Destructive Locusts of California. (Pacific Rural Press.)

1876.—Botany of California, by Brewer, Gray and Watson—a notice. (S Fran. News-Letter, Aug. 26th.)

1876.—Pacific Coast Lepidoptera, No. 16.—Notes on the Transformations of some species of Lepidoptera not hitherto recorded. (Proc. Cal. Acad. Sc., VII., pp. 19–24.)

1876.—Pacific Coast Lepidoptera, No. 17.—On the Transformation of Colias (Meganostoma Reak), Eurydice, Bdv. (Proc. Cal. Acad. Sc., VII., pp. 60–62.)

1876.—Pacific Coast Lepidoptera, No. 18.—Description of a new species of Heterocampa (Larva and Imago). Proc. Cal. Acad. Sc., VII., pp. 121–122.)

1876.—Pacific Coast Lepidoptera, No. 19.—Notes on a singular variety of the Larva of Halisidota Agassizii, Pack. (Proc. Cal. Acad. Sc., VII., pp. 128–130.)

1876.—Pacific Coast Lepidoptera, No. 20.—Notes on the Case-Bearing Moths (Psychidæ) with notices of Californian species. (Proc. Cal. Acad. Sc., VII., pp. 140–143.)

Republished in the S. Francisco Evening Bulletin, Nov., and Pacific Rural Press, Nov.

1876.—Pacific Coast Lepidoptera, No. 21.—Descriptions of two new species of the Genus Thecla. (Proc. Cal. Acad. Sc., VII., pp. 143–145.)

1876—Pacific Coast Lepidoptera, No. 22.—Notes on some Diurnal Lepidoptera, with descriptions of new varieties. (Proc. Cal. Acad. Sc., VII., pp. 163–173.)

1877.—Pacific Coast Lepidoptera, No. 23.—Description of a new species of Catocala, and a List of the Californian Specimens of the Genus known to occur in collections. (Proc. Cal. Acad. Sc., Feb. 5, pp. 1–2.)

1877.—Pacific Coast Lepidoptera, No. 24—Notes on the Genus Colias, with descriptions of some apparently new forms. (Proc. Cal. Acad. Sc., Feb. 5, pp. 1-11.)

1877.—Pacific Coast Lepidoptera, No. 25.—Description of a new species of Plusia from Arizona. (Proc. Cal. Acad. Sc., Mar. 5, p. 1.)

1877.—Pacific Coast Lepidoptera, No. 26.—Description of two new forms of Diurnals. (Proc. Cal. Acad. Sc., Dec. 17, p. 1.)

1877.—Notes on species of Cicada. (Pacific Rural Press, July.)

1877.—Pacific Coast Lepidoptera, No. 27.—Transformations of some species not hitherto recorded. (Proc. Cal. Acad. Sc., June 17, pp. 2–4.)

1877.—Notes on the Devil-Bean of Mexico, Carpocapsa saltitans. (Pacific Rural Press.)

1878.—Note on Prionus Californicus. (Pacific Rural Press, March.)

1878.—Pacific Coast Lepidoptera, No. 28.—On the occurrence of some rare species of Diurnals in California. (Proc. Cal. Acad. Sc., June 17, pp. 5, 6.)

1878.—Pacific Coast Lepidoptera, No. 29.—Description of some new genera and species of Noctuidæ. (Proc. Cal. Acad. Sc, July 1, pp. 7-10.)

1878.—Pacific Coast Lepidoptera, No. 30.—Notes on the Genus Parnassius. (Proc. Cal. Acad. Sc., July 15th, pp. 11–14.)

1880.—Pacific Coast Lepidoptera, by Henry Edwards. From the Proceedings of the California Academy of Sciences. Author's Copy, New York, 3 plates.

(This volume is composed of author's extras of the Pacific Coast Lepidoptera, Nos. 1–30. The title page and index were published by Mr. Edwards. A limited number of copies were issued, and only about ten contain the three plates.

1880.—Descriptions of some new species of Catocala. (Bull. Bklyn. Ent. Soc., II., pp. 93–95.)

1880.—Notes upon the Genus Catocala, with descriptions of new varieties and species. (Bull. Bklyn. Ent. Soc, III., pp. 53–62.)

1880.—Descriptions of some new forms of Ægeriadæ. (Bull. Bklyn. Ent. Soc., III., pp. 71, 72.)

1881.—Introductory notice of Papilio. (Papilio, I., p. 1.)

1881.—On two new forms of the Genus Parnassius. (Papilio, I., pp. 2–4.)

1881.—Description of two new species of Lithosidæ. (Papilio, I., p. 12.)

1881.—New genera and species of N. American Noctuidæ. (Papilio, I., pp. 19–28.)

1881.—Notes on the Pacific Coast Species of Hepialus, with descriptions of new forms. (Papilio, I., pp. 35–36.)

1881.—Description of new species and varieties of Arctiidæ. (Papilio, I., pp. 38–39.)

1881.—On some apparently new forms of Diurnal Lepidoptera. (Papilio, I., pp. 50–55.)

1881.—Notes on the Pacific Coast Species of Orgyia, with descriptions of Larvæ and new forms. (Papilio, I., pp. 60–62.)

1881.—Descriptions of some species of Catocala, (published in Strecker's Lepid. Rhopal et Heterocera, vol. I., pp. 99, 100).

1881.—A New Genus and some new forms of North American Zygænidæ. (Papilio, I., pp. 80–81.)

1881.—Description of some new species of N. American Moths. (Papilio, I., pp. 100–101.)

1881.—Descriptions of some new species of Heterocera. (Papilio, I., pp. 115–121.)

1881.—A new and remarkable Bombycid Moth from Arizona. (Papilio, I., pp 171–172.)

1881.—New genera and species of the family Ægeriadæ. (Papilio, I., pp. 179–208, pl. 1.)

1881.—Biographical Sketch of Joseph Duncan Putnam. (Papilio, I., p. 223.)

1882.—New Species of Heterocera. (Papilio, II., pp. 9–15.)

1882.—Notes on N. American Ægeriadæ, with descriptions of new forms. (Papilio, II., pp. 52–57.)

1882.—Index to Papilio, vol. I.

1882.—Note on Mr. Swinton's work on "Wing Variations in Lepidoptera. (Papilio, II., p. 18.)

1882.—Powerful Insecticide—note on. (Papilio, II., p. 34.)

1882.—Swarming of Colias Philodice. (Papilio, II., p. 34.)

1882.—Note on Dr. Packard's Paper on Butterfly Parasites. (Papilio, II., p. 34.)

1882.—Insect Pests in California. (Papilio, II., p. 34.)

1882.—Dwarf Butterflies—note on. (Papilio, II., p. 34.)

1882.—Synopsis of Noctuidæ, by J. B. Smith—note on. (Papilio, II., p. 50.)

1882.—Bombycidæ of N. America, by R. H. Stretch—note on. (Papilio, II., p. 50.)

1882.—Obituary notice of Charles Robert Darwin, F.R.S. (Papilio, II., p. 81.)

1882.—Sale of Mr. Grote's collection—note on. (Papilio, II, p. 82.

1882.—Early Appearance of Actias Luna. (Papilio, II., p. 82.)

1882.—Further notes and descriptions of N. American Ægeriadæ. (Papilio, II., pp. 96–99.)

1882.—On the early stages of Papilio Rutulus, Bdv. (Papilio, II., p. 112.)

1882.—Papilio albanus, Feld.—note on. (Papilio II., p. 122.)

Descriptions of New Species of N. American Heterocera. (Papilio, II., pp. 123–130.)

1882.—Obituary notice of Charles Godfrey Siewers. (Papilio, II., p. 145.)

1882.—Notice of Grote's New Check List and Illustrated Essay. (Papilio, II., p. 146.)

1882.—Fans on the Feet of Catocaline Moths. (Papilio, II., p. 146.)

1882.—Napthaline Cones. (Papilio, II., p. 147.)

1882.—Phycidæ of the United States—note on. (Papilio, II., p. 148.)

1882.—On Parnassius Thor. (Papilio, II., p. 148.)

1883.—A Mingled Yarn, sketches on various subjects, New York, 12 mo., 157 pp.

This volume contains the following subjects :—

Three Weeks in Mazatlan—pp. 1–64.

Iron and its Relation to Civilization—pp. 65–85.

Shakespeare—pp. 89–98.

Address on the occasion of the removal of the Bohemian Club from Sacramento street to Pine street, December, 1876—pp. 99–105.

Edwin Adams (obituary notice)—pp. 106–111.
James Hamilton (funeral address)—pp. 112–115.
Joseph Maquire (funeral address)—pp. 116–120.
Midsummer "High Jinks."—pp. 121–127.
Two Balloon Voyages—pp. 131–138.
The Church and the Stage—pp. 139–147.
Agassiz (obituary notice)—pp 148–150.
Major Harry Larkyns (funeral address)—pp. 151–154.
William Barry (funeral address)—pp. 155–157.

1883.—Notes on the Early Stages of some Heterocera. (Papilio, III., p. 24.)

1883.—Sphinx Sequoiæ. (Papilio, III., p. 25.)

1883.—Rare Lepidoptera in New Jersey. (Papilio, III., p. 25.)

1883.—Asilus and Geometers. (Papilio, III., p. 25).

1883.—Papilio Chresphontes, Cr. (Papilio, III., p. 26)

1883.—New forms of the Genus Alypia. (Papilio, III., pp. 33–34.)

1883.—Callidryas Fisheri—Description of. (Papilio, III., p. 43.)

1883.—Obituary notice of G. W. Belfrage. (Papilio, III., p. 83.)

1883.—"The Caterpillar Pest," Letters to the Evening Telegram on depredations of Orgyia leucostigma, June 26th, June 29th, July 12th.

1883.—On the Transformations of some species of Lepidoptera (written in conjunction with S. L. Elliott). (Papilio, III., pp. 125–136.)

1883.—Some species of Euchaetes. (Papilio, III., pp. 145–148.)

1883.—New species of Ægeriadæ. (Papilio, III., pp. 155–157.)

1883.—Obituary notice of James Spencer Bailey. (Papilio, III., p. 166.)

1883.—Obituary notice of John L. Leconte. (Papilio, III., p. 168.)

1883 —Eggs of Tolype velleda. (Papilio, III., p. 189.)

1883.—Orgyia Badia—note on. (Papilio, III., p. 189.)

1883.—Spilosoma latipennis, Stretch. (Papilio, III., p. 190.)

1883.—Etudes d'Entomologie—note on. (Papilio, III., p. 193.)

1883.—Farewell to subscribers of Papilio. (Papilio, III., p. 193.)

1884.—Address to subscribers of Papilio. (Papilio, IV., p. 1.)

1884.—Notes on Mexican Lepidoptera, with descriptions of new species. (Papilio, IV., pp. 11–19.)

1884.—Papilio Antimachus, Dr.—note on. (Papilio, IV., p. 21.)

1884.—The Lepidopterous Genus Datana. (Papilio, IV., pp. 23–26.)

1884.—Monographs of North American Lepidoptera. (Papilio, IV., p. 38.)

1884.—Mexican Lepidoptera—note on. (Papilio, IV., p. 41.)

1884.—Some new forms of North American Moths. (Papilio, IV., pp. 43–48.)

1884.—Notes on Mexican Lepidoptera, with descriptions of new species (2nd paper). (Papilio, IV., pp. 59–61.)

1884.—Notes on Mexican Lepidoptera, with descriptions of new species (3rd paper). Papilio, IV., pp. 75–80.)

1884.—The Genus Gloveria. (Papilio, IV., pp. 105–109).

1884.—Apparently new species of North American Heterocera. (Papilio, IV., pp. 121–126.)

1885.—New Bombycidæ from Colorado. (Ent. Am., I., p. 17.)

1885.—New Species of California Moths. (Ent. Am., I., pp. 49–50.)

1885.—Notes on Mexican Lepidoptera, with descriptions of new species (4th paper). (Ent. Am., I., pp. 128–129.)

1885.—A New Arctian. (Can. Ent., XVII., p. 65.)

1886.—Notes on North American Zygænidæ and Bombycidæ, with descriptions of new forms. (Ent. Am., II., pp. 8–15.)

1886.—Apparently new forms of N. American Heterocera. (Ent. Am., II., pp. 165–171.)

1887.—Apparently new species of Mexican Heterocera (5th paper.) (Ent. Am., III., pp. 89–92.)

1887.—Early stages of Orgyia Nova, Fitch. (Ent. Am., III , p. 146.)

1887.—Early stages of some North American Lepidoptera. (Ent. Am., III., pp. 161–170.)

1887.—Descriptions of new species of North American Heterocera, with notes. (Can. Ent., XIX., pp. 145–147.)

1887.—A New Variety of Papilio and a New Catocala from the Pacific Coast. (Can. Ent., XIX., p. 199.)

1888.—New Genera and species of North American Moths. (Ent. Am., III., pp. 181–185.)

1888.—Catalogue of the species of the Higher Families of North American Heterocera, described since Grote's "New Check List," (1882.) with those omitted from that publication. (Ent. Am., III., pp. 221–232.)

1888.—Euproserpinus Euterpe, a new species of Sphingidæ. (Ent. Am., IV., pp. 25–26)

1888.—Early Stages of some North American Moths. (Ent. Am., IV., pp. 61–62.)

1888.—Notes on Lepidoptera. (Ent. Am. IV., p. 63.)

1888.—Three species of Moths new to our Fauna. (Can. Ent., XX., pp. 12–15.)

1888.—Three Moths new to our Fauna. (Can. Ent. XX., pp. 111–113.)

1889.—Notes on Noises made by Lepidoptera. (Insect Life, II., pp. 11–15.)

1889.—Bibliographical Catalogue of the described Transformations of North American Lepidoptera. (Bull. U. S. Nat. Mus., No. 35, 147 pp.)

1890.—Notes on the Habits and earlier stages of Cryptophasia unipunctata. (Proc. Linn. Soc., N. S. Wales, V., pp. 300–302.)

Republished in Insect Life, III., p. 384, fig.

1890.—Some apparently new Noctuidæ in the collection of the British Museum. (Ent. Am., VI., pp. 114–115.)

1891.—Birth of a beautiful exotic Lepidopterous Insect in New York. (Insect Life, III., p. 316.)

1891.—Descriptions of two new species of Ægeriadæ, published in Dr. Otto Lugger's paper on Two New Lepidopterous Borers. (Psyche, vol. VI., pp. 108–109.)

A CATALOGUE OF THE THYSANOURA OF NORTH AMERICA

BY ALEX. D. MACGILLIVRAY, CORNELL UNIVERSITY.

There being no published list of the American species of Thysanoura, I have thought it advisable to bring my notes together in a connected form. The names adopted are based on a careful study of many specimens from all parts of the country, and the arrangement of families and genera is a combination of that of Tullberg, Lubbock, and Comstock. I have preceded the catalogue by a list of the more important papers containing descriptions of American species, and I have followed the names of all those species known to me by an exclamation point. The specimens upon which this study is based are deposited in the Entomological Museum of Cornell University. I desire to take this opportunity of thanking Mr. Nathan Banks, Washington, D. C.; Prof. H. E. Summers, Knoxville, Tenn.; Mr. A. P. Morse, Wellesley College, Mass., and Mr. Trevor Kincaid, Olympia, Washington State, for numerous new and interesting species.

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Suborder SYMPHYLA, Ryder.

Family SCOLOPENDRELLIDÆ, Newport.

Genus SCOLOPENDRELLA, Gervais.

1. *gratiae* Ryder. (!) Amer. Nat., XIV., (1880) p. 375; Proc. Acad. Nat., Sci p. 85, fig. N Y., Penn., Md., D. C, Ohio, Tenn.
2. *notocantha* Gerv. Aptéres, IV., p. 301, pl. 39, fig 7.; Ryder, Proc. Acad. Nat. Sci., p. 84, fig. France, (?) Penn., Md.
3. *latipes* Scudder. Bost. Soc. Nat. Hist., XXII., p. 65. Mass.

Suborder CINURA, Packard.

Family JAPYGIDÆ, Haliday.

Genus JAPYX, Haliday.

4. *Saussurii* Humbert. Rev. et Mag. Zool. (1868), p. 345. Mexico.
5. *subterraneus* Packard.! Amer. Nat., VIII., (1874), p. 501. Kentucky, D. C.

Family CAMPODEIDÆ, Lubbock.

Genus CAMPODEA, Westwood.

6. *Americana* Packard. (!) Proc. Bost. Soc. Nat. Hist., XIII., (1871) p. 409; Syn. Thysan. Essex Co. (1873), p. 45. Mass., N. Y., D. C., Ohio, Tenn.
7. *Cookei* Packard. American Naturalist, V., (1871) p. 747; Syn. Thysan. Essex Co. (1873), p. 46; Cave Fauna N. A., p. 67, pl. XVII., figs. 1, 1a–i. Caves of Kentucky and Indiana.
8. *Mexicana* Packard. American Naturalist, XX, (1878) p. 383. Mexico.

Family LEPISMIDÆ, Leach.

Genus MACHILIS, Latreille.

9. *brevicornis* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 49. Texas, Tenn.

10. *cavernicola* Tellkmpf. Triura cavernicola Tell., Archiv. für naturgeschichte, X., Bd. I., p. 321; Packard, Amer. Nat., V., p. 747; Syn. Thysan. Essex Co. (1873), p. 51; Cave Fauna N. A., p. 67. Kentucky.

11. *orbitalis* Packard (!) Syn. Thysan. Essex Co. (1873), p. 50. Idaho, Washington State.

12. ***variabilis*** **Say.(!) Journ. Acad. Nat. Sci. Philad., II., (1821), p. 12; Le Conte Edition, II., p. 7; Packard, Syn. Thysan. Essex Co. (1873), p. 50; Lubbock, Monog. Collem. and Thysan. (1873), p. 240. Mass., N. Y.; Ind., Tenn.**

13. ***vittata*** **Burmeister. Hand. d. Ent.; Nicolet, Ann. Soc. Ent., France, (1847); Lubbock, Monog. Collem. and Thysan. (1873), p. 241. Carolina.**

Genus LEPISMA, Linn.

14. *anopthalma* Bilimek. Vehr. d. Kais.-Konig. Zool.-Botan. Ges. in Wien, XVII., p. 905. Mexico.

15. *collaris* Fabricius. (!) Ent. Sys.; Gervais, Hist. Ins. Apt., III.; Burmeister, Hand. d. Ent.; Packard, Syn. Thysan. Essex Co. (1873), p. 47; Lubbock, Monog. Collem. and Thysan. (1873), p. 223. West Indies.

16. *mucronata* Packard. Syn. Thysan. Essex Co. (1873), p. 49. West Coast of Nicaragua.

17. *quadriseriata* Packard. (!) ibid., p. 47. Mass., Rhode Island, N. Y. Conn., Tenn.

18. *saccharina* Linnaeus. (!) Faun. Suec.; Burmeister, Hand. d. Ent.; Nicolet, Ann. Soc. Ent. France (1847); Packard, Syn. Thysan. Essex Co. (1873), p 47; Lubbock, Monog. Collem. and Thysan. (1873), p. 268. Europe, North America.

Genus THERMOBIA, Bergroth.

19. *domestica* Packard. Lepisma domestica Pack., Syn. Thysan. Essex Co. (1873), p. 48. Mass.

Suborder COLLEMBOLA, Lubbock.

Family SMYNTHURIDÆ, Lubbock.

Genus SMYNTHURUS, Latreille

20. *arvalis* Fitch. (!) Eighth Rept. Ins. N. Y. (1862), p. 673; Cucumerus Harris (MSS.), Correspondence p. 362; roseus Packard, Syn. Thysan. Essex Co. (1873), p. 43. Mass., N. Y., Ohio.

21. *elegans* Fitch. (!) Eighth Rept. Ins. N. Y. (1862), p. 674; Packard, Syn. Thysan. Essex Co. (1873), p. 43. Mass., N. Y., Ohio, West Virginia, Tenn.

22. *ferrugineus* Packard. Cave Fauna N. A., p. 67, pl. XVI., figs. 4, 4a–c. Caves of Virginia.

23. *hortensis* Fitch. (!) Eighth Rept. Ins. N. Y. (1862), p. 668; signifer Fitch, ibid., p. 675. N. Y., Ohio.

24. *quadrimaculatus* Ryder. (!) Proc. Acad. Nat. Sci., Philad. (1878), p. 335, fig. Mass., Penn.

25. *quadrisignatus* Packard. Syn. Thysan. Essex Co. (1873), p. 44. Maine.

Genus PAPIRUS, Lubbock.

26. *guttatus* Say. Smynthurus guttatus Say, Journ. Acad. Nat. Sci., II., p. 13; LeConte Edition, II., p. 8; Lubbock, Monog. Collem and Thysan. (1873), p. 115. Georgia.

27. *marmoratus* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 42. Maine, Mass., Long Island, N. Y.

28. *novæboracensis* Fitch. (!) Smynthurus novæboracensis Fitch, Eighth Rept. Ins. N. Y. (1862), p. 674. N.Y., Ohio.

29. *texensis* Packard. Syn. Thysan. Essex Co. (1873), p. 43. Texas.

Family ENTOMOBRYIDÆ, Comstock.

Genus ORCHESELLA, Templeton.

30. *flavopicta* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 41. N. Y., Long Island, Mass., Tenn.

Genus TOMOCERUS, Nicolet.

31. *plumbeus* Linnaeus. (!) Podura plumbea Linn., Systema Naturae;

bicolor Say, Journ. Acad. Nat. Sci. Philad., II., p. 13; LeConte Edition, II., p. 8; longicornis Muller, Zool. Dan. Prod. (1776); iricolor Say, Journ. Acad. Nat. Sci. Philad., II., (1821) p. 13; LeConte Edition, II., p. 8; Tomocerus longicornis Lubbock, Monog. Collem. and Thysan., (1873) p. 137, pls. 17 and 18; Packard, Syn. Thysan. Essex Co. (1873), p. 38; Isotoma bicolor Lubbock, Monog. Collem. and Thysan., p. 177; Lepidocyrtus iricolor Lubbock, ibid., p. 157. Europe and North America.

Genus SEIRA, Lubbock.

32. *Buskii* Lubbock. (!) Monog. Collem. and Thysan. (1873), p. 145. Great Britain, N. Y.

Genus BECKIA, Lubbock.

33. *cavernarum* Packard. Degeeria cavernarum Pack., Cave Fauna N. A., p. 66, pl. XVI., figs. 2, 2 a–g. Kentucky, Indiana.

Genus LEPIDOCYRTUS, Bourlet.

34. *albus* Packard. (!) Syn. Thysan. Essex Co., (1873), p. 73, Maine, Mass., N. Y., Ohio, Tenn.

35. *atropurpureus* Packard. Cave Fauna N. A., p. 66, pl. XVI., figs. 3, 3a–b. Kentucky.

36. *bipunctatus* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 37. Texas.

37. *marmoratus* Packard. ibid., p. 36. Mass.

38. *metallicus* Packard. (!) ibid., p. 36. Maine, Mass., N. Y., Ohio, Tenn.

39. *pusillus* Linnaeus. Lubbock. Monog. Collem. and Thysan. (1873), p. 156; Packard, Syn. Thysan. Essex Co. (1873), p. 37. Greenland, Europe.

Genus ENTOMOBRYA, Rondani.

40. *carneiceps* Packard. (!) Orchesella Carneiceps Pack., Syn. Thysan. Essex Co. (1873), p. 40. Ohio, D. C., Tenn.

41. *fasciata* Say. (!) Podura fasciata Say, Journ. Acad. Nat. Sci., Philad., II., (1821) p. 12; LeConte Edition, II., p. 8; Degeeria fasciata Lubbock, Monog. Collem. and Thysan. (1873), p. 166; 10-fasciata Pack., Syn. Thysan. Essex Co. (1873), p. 40; Entomobrya multifasciata Tullb. Brooks, Journ. Linn. Soc.—Zool., XVII., p. 275. Maine, Mass., N. Y., Ohio, Tenn., Texas, Georgia, East Florida.

42. *griseo-olivata* Packard. (!) Degeeria griseo-olivata Pack., Syn. Thysan. Essex Co. (1873), p. 39; Entomobrya griseo olivata, Brooks, Journ. Linn, Soc.–Zool., XVII., p. 281. Mass., N. Y.

43. *perpulchra* Packard. (!) Degeeria perpulchra Pack., Syn. Thysan. Essex Co. (1873), p. 38; Entomobrya perpulchra Brooks, Journ. Linn. Soc.—Zool., XVII., p. 281. Texas.

44. *purpurascens* Packard. (!) Degeeria purpurascens Pack., Syn. Thysan. Essex Co. (1873), p. 39; Entomobrya purpurascens Brooks, Journ. Linn. Soc.—Zool., XVII., p. 282. Maine, Mass., Tenn.

Genus Isotoma, Bourlet.

45. *albella* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 32. Maine, Mass., N. Y.

46. *Belfragei* Packard. ibid., p. 33. Texas.

47. *Besselsii* Packard. Amer. Nat. (1877), pp. 51, 52, foot-note. Polaris Bay.

48. *bidenticulata* Tullburg. Collembola borealia (1876), p. 35, Tab. X., figs. 17 and 18. Greenland, Northern Europe.

49. *fimetaria* Linnaeus. Podura fimetaria Linn., Syst. Nat., Ed. X., P. I., p. 609; Isotoma fimetaria Tullb., Sv. Podur., p. 48; Collembola borealia (1876), p. 37. Greenland, Siberia.

50. *glauca* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 33. Mass., Ohio.

51. *leonina* Packard. (!) ibid., p. 32. Mass., N. Y.

52. *nivalis* Packard. (!) ibid., p. 31. Maine, Mass.

53. *plumbea* Packard. (!) ibid., p. 35; Guide to the Study of Insects, pl. X., figs. 6, 7. Mass., Long Island, Ohio.

54. *purpurascens* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 34. Texas.

55. *quadrioculata* Tullberg. Fört öfver. sv. Podr. (1871), p. 152; Collembola borealia (1876), p. 36. Greenland, Northern Europe.

56. *tricolor* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 34. Mass., D. C., Texas.

57. *Walkerii* Packard. (!) Memoirs Peab. Acad. Sci. 2 (1873), p. 19; Syn. Thysan. Essex Co. (1873), p. 34. Mass., Eastern, Ohio.

Family PODURIDÆ, Burmeister.

Genus ACHORUTES, Templeton.

58. *armatus* Nicolet. Podura armata Nic., Resch. p. serv. à l' Hist. des Podur. (1841), p. 57. Achorutes armatus Lubbock, Monog. Collem. and Thysan. (1873), p. 180; Tullberg, Fört öfver Sv. Podur, (1871), p. 153; Collembola borealia (1876), p. 38, Tab. X., fig. 35. Greenland, Siberia.

59. *boletivorus* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 30. Maine, Mass., New York, D. C.

60. *marmorata* Packard. (!) Ibid., p. 30. Maine, (?) Ohio.

61. *nivicola* Fitch. (!) Podura nivicola Fitch, Emmon's Journ. Sci. Agr., V., (1846-47), p. 151; Achorutes nivicola Pack., Syn. Thysan Essex Co. (1873), p. 29; Lintner, Second Rept. N. Y. Entom., p. 203. Mass., New York, Penn., (?) Wisconsin.

62. *pratorum* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 31. Maine, New York.

63. *texensis* Packard. Ibid., p. 30. Texas.

Genus XENYLLA, Tullberg.

64. *humicola* Fabricius. Podura humicola Fab., Fauna Groen., (1780), p. 213; Achorutes humicola Lubbock, Monog. Collem. and Thy-

san. (1873), p. 183 ; Isotoma humicola Packard, Syn. Thysan. Essex Co. (1873), p. 35 ; Xenylla humicola Tullberg, Collembola borealia, (1876) p. 38. Norway, Sweden, Greenland.

65. *maritima*, O. Fabr. Podura maritima O. Fabricius, Fauna Groenlandica ; Xenylla maritima Tullberg, Skand. Podur af underfam. Lip. (1869), p. 11 ; Sveriges Poduridea, (1872), p. 52, Tab. XI., figs. 7, 8 ; Lubbock, Monog. Collem. and Thysan., p. 187. Greenland, Sweden.

Genus PODURA, Linnæus.

66. *aquatica* Linnaeus. Podura aquatica Linn., Syst. Nat. Ed., X., p. 609 ; Hypogastrura aquatica Bourlet, Mem. Soc. Roy. Lille (1839). p. 31 ; Podura aquatica Lubbock, Monog. Collem. and Thysan, (1873), p. 185, pl. 42 ; Tullberg, Sveriges Podurider, p. 50, Tab. X., figs. 1–6 ; Packard, Syn. Thysan. Essex Co. (1873), p. 35. Greenland, Europe.

Family LIPURIDÆ, Lubbock.

Genus LIPURA, Burmeister.

67. *ambulans* Linnaeus.(!) Podura ambulans Linn., Syst. Nat. Ed., X., P. 1, p. 609 ; Lipura ambulans Burm., Hand. d. Entom. (1838), B. 11., p. 447 ; Lubbock, Monog. Collem. and Thysan. (1873), p. 189, pl. 43 ; Tullberg, Sveriges Podurider (1871), p. 55, Tab. XI., figs. 16–29 ; Packard, Syn. Thysan. Essex Co. (1873), p 29. New York, Ohio, D. C.

68. *armata* Tullberg. Skand. Podur. of. underfam. Lip. (1869), p. 18 ; Collembola borealia, p. 39. Greenland.

69. *fimetaria* Linnaeus.(!) Podura fimetaria Linn., Sys. Nat. Ed., X., P. 1., p. 609 ; Lipura fimetaria Burm., Hand. d. Ent. (1838) ; Lubbock, Monog. Collem. and Thysan, (1873), p. 191., pl. 46 ; Packard, Syn. Thysan. Essex Co. (1873), p. 28 ; Lintner, Second Rept. N. Y. Entom.p., 208. Mass., N. Y., D. C., Ohio.

70. *Grœnlandica* Tullberg. Collembola borealia (1876), p. 41, Tab. XI., figs. 57 and 58. Greenland, Spitzbergen.

71. *lucifugus* Packard. Cave Fauna N. A. (1886), p. 65, pl. 16, fig. 1 placed in this genus provisionally by Packard. Kentucky.

Genus ANURIDA, Laboulbene.

72. *maritima* Guerin. Achortes maritimus Guer., Iconog. du Regne Animal, Texte Explic; Lipura maritima, Lubbock, Monog. Collem. and Thysan., (1873), p. 193, pl. 47; Anurida maritima Laboul., Ann. Soc. Ent., France, (1864); Packard, Syn. Thysan. Essex Co. (1873), p. 28. Europe, Eastern Coast of U. S.

Genus ANOURA, Gervais.

73. *gibbosa* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 27. Maine, New York.

74. *granaria* Nicolet. (!) Ann. Soc. Ent. France (1847), p. 387; anurida granaria Tullberg, Skand. Podur. of. Underfam. Lip. (1869), p. 20; Anoura granaria Lubbock, Monog. Collem. and Thysan. (1873), p. 198, pl. 49. Europe, Ohio.

THE GENUS PACKARDIA G. & R.

BY HARRISON G. DYAR.

In the Trans. Am. Ent. Soc. I offered a revision of the species of this genus, in which I reduced the number of species to five; but, from recent experience, I am of the opinion that this number will have to be still further reduced. I have bred a moth that forms an intergrade between *P. elegans* and *P. fusca*, and have noticed no difference between the larvæ that produced typical *elegans* and *fusca*. The same is true of larvæ that produces *geminata* and *albipunctata*. Therefore, if I am correct, the species of *Packardia* must be reduced to two, as follows. I regard the evidence as conclusive concerning the synonymy of the first species: that of the second, being more involved, is less certain, especially as I have bred but few of the moths, though I have little doubt but that it will prove correct.

PACKARDIA ELEGANS Packard.
nigripunctata Goodell.
var. fusca Pack.

Larva.—Head retracted under joint 2; joint 2 partly under joint 3; dorsal region narrow; body highest at joint 7, rounding to the extremities. Subdorsal ridges distinct, not raised, segmentally undulate, approaching each other posteriorly and marked with a yellow line which begins on joint 3, not joining over the dorsum. Sides nearly perpendicular, a little sloping and bulging superstigmatally, but not forming a decided lateral ridge; joint 13 produced into a rather long, narrow, pointed tail, marked with reddish purple above. Body closely covered with small transparent granulations; colour, light yellowish green, dorsal region dark green, with a small dorsal dot on each joint (joints 6–11) largely surrounded with pale yellowish green, reaching to the subdorsal lines except on joint 11. Sides nearly uniform yellowish green; above the lateral bulge is a segmental row of depressed darker spots, beginning on joint 4 and becoming indistinct after joint 9; on the lateral bulge a row of yellowish spots on joint 6–9. Spiracles white, small, round, conically elevated A white line borders the venter, which is colourless. Thoracic feet small, abdominal ones wanting as usual in the subfamily. Head green, jaws brown, ocelli black. Length of larva 11 mm., width 5.5 mm., height 3.5 mm.

The subdorsal and lateral ridges have traces of tubercles, not elevated, but a little smoother than the rest of the body, bearing very minute short setæ, just perceptible with a lens in certain lights. These represent the tubercles of the following species:—

PACKARDIA GEMINATA Packard.
Var. albipunctata Pack.
ocellata Grote.
goodellii Grote.

Larva.—Body elongate elliptical, sides nearly perpendicular, slightly ridged above the spiracles; dorsal region flat, highest at joint 7 and sloping each way; subdorsal ridge moderately prominent, straight; joint 13 prolonged into a pointed tail very faintly marked with reddish toward the end. Along each subdorsal ridge is a series of little conical tubercles (seen with a lens), two per segment, close together and each bearing a very short seta; a similar row along the superstigmatal ridge, but single and smaller, and the setæ even shorter and finer than those on the sub-

dorsal ridge. A series of dorsal and lateral depressions, not distinctly different from the rest of the body in structure or colour, though the lateral ones are slightly darker. The body is thickly covered with little transparent granulations. Colour, pale, decidedly whitish green (not yellowish), a white line along the subdorsal ridge bordered above with dark green, the lines obsoletely connected on joint 3, but not passing on to the tail. A row of obscure white dashes along the superstigmatal ridge, looking as if beneath the surface of the skin. Spiracles small, round, projecting, white. A faint whitish line separates the clear colourless venter from the body. Head pale green, the mouth parts largely dark brown. It is retracted below, and folded within joint 2, which has the spiracle somewhat flattened. Length of larva 14 mm., width 6.5 mm.

Food plants of both species of *Packardia*, various deciduous trees.

It may be that *P. albipunctata* is distinct from *P. geminata*, but the only difference of importance is the colour of the secondaries, which are pale in the latter and nearly black in the former; but I have not been able to distinguish the larvæ. *Ocellata* and *goodellii* might be considered as varieties of *albipunctata* with the primaries respectively paler and darker than in the typical form.

DESCRIPTIONS OF SOME BUTTERFLY LARVÆ FROM YOSEMITE.—IV.

BY HARRISON G. DYAR.

Heterochroa californica Butler.

Egg.—Nearly spherical, flattened a little at base; covered with hexagonal elevated reticulations, from the intersections of which arise short spines. Colour uniform leaf-green, with a silvery lustre; width 1.5 mm. Laid singly at the tip of a leaf on the upper side. Duration of this stage eleven days.

First larval stage.—Head large, round, flat on the posterior side, roughened with a few little tubercles that bear minute setæ. Colour pale wood-brown, not shiny, the mouth parts dark brown and ocelli black; width 1.1 mm. Body cylindrical, with short conical tubercles and many minute granulations, each with a minute seta. The subdorsal tubercles on joints 3, 4, 6 and 12 are larger than the others and shaded with blackish. Colour leaf-green, the tubercles and all of joints 12 and 13 pale

yellowish. Feet concolorous with the body. Length on exclusion from the egg, 4.5 mm. The larva builds a perch at the end of a leaf in the manner of *Limenitis* larvæ.

Second stage.—Head large, rounded, densely covered with conical tubercles, with three spines arranged in a triangle at the apex of each lobe; pale greenish, with a brownish tinge, and two brown shades, one before and one behind the eyes on each side, running nearly to the vertex. Clypeus small, triangular, pale; jaws brown, ocelli and the three apical spines black; many of the longer tubercles at the sides of the head are tipped with black; width 1.8 mm. Body of uniform width, densely covered with yellowish conical tubercles and a subdorsal row of tuberculated processes, those on joints 3, 4, 6 and 12 much larger than the rest (especially the one on joint 3), and ending in four or five black conical spines. Colour pale brownish yellow, paler subventrally, with indications of a blackish subdorsal band. As the stage advances the dorsum becomes shaded with brown.

Third stage.—Head larger than the body, flat behind and somewhat flattened in front, not bilobed, but central suture depressed; clypeus small, densely covered with tubercles and a double row of long conical spines along the sides and over the vertex; another spine below the vertex of each lobe, and a large rounded tubercle above the ocelli. Reddish brown, the clypeus, a band on the ocelli tapering upward to a point, and all the tubercles and spines yellowish-white; ocelli and the tips of the vertical and lateral spines black; width 2.8 mm. Body as before, densely tuberculated, many of the tubercles in the subdorsal and subventral regions partaking of the character of branching spines. On joints 3, 4, 6 and 12 are a pair of large, thick, subdorsal processes (2.5 mm. long), covered with granulations and large conical spines like those on the head; on joints 8 and 11 a smaller but similar pair. General colour light reddish-brown, with a greenish tinge, especially on the sides. The processes are brown, most of the tubercles and spines yellowish, but the larger spines are tipped with black. Traces of a black subdorsal line and black dorsal marks between the long processes.

Fourth stage.—Head very large, flattened before and behind, almost disc-like, not bilobed, the outline from in front obtusely conical; clypeus rather small; median suture deeper on the vertex than elsewhere. Front nearly smooth, with only a few slight granulations, but around the lateral edge and vertex is a double row of long spines, the vertical ones most

prominent, all intermixed with many shorter tubercles, much as in the previous stage. Colour brown with a pinkish tinge in front, pale behind and below, a tapering whitish band over the ocelli and another obscure one on each side of the clypeus; labrum white; ocelli black; the spines, except a black one below the apex of each lobe, yellowish-white; width 4 mm. The jaws are greenish, black at base and tip. Body densely covered with small, conical, pointed, yellowish tubercles on an olive green ground, which gives it a beautiful mossy green appearance; along the subventral fold these tubercles are very long and thick, which gives the appearance of a yellowish subventral line. The region below this, the legs and venter are brown. A lateral row of super-stigmatal conical tubercles, one on each segment, larger than those covering the body; the one on joint 3 is branched, but there are none on joints 2 and 13. The subdorsal processes are very long and large, those on joints 3, 4, 6 and 12 the largest (5 mm. long), dark brown, covered with many conical thick spines of varying length which are white and tipped with black. On joint 2 there is no subdorsal process; on joint 5 only a slight tubercle; on joint 7 a somewhat larger one, which is branched; on joints 8 and 11 a moderate process (2 mm. long); on joints 9, 10 and 13 and on the anal plate is a branched tubercle. On the feet, and less distinctly also on the subventral region, short hairs arise from the granulations, but not elsewhere on the body. The spiracles on joint 2 are faintly black rimmed, the others concolorous with the body. As the stage advances the olive green colour assumes a rather lighter tint and shades into yellowish at the subventral row of spines. When at rest the head is turned down, the anal feet elevated, the processes on joints 3 and 4 point forward, those on joint 4 also projecting laterally, while the pair on joint 6 lean backward. At the end of the stage the larva fades to a uniform straw-yellow, the head pale brown, and spins its button of silk for suspension.

Chrysalis.—Shaped somewhat as in *Limenitis;* a long pointed, trilateral, angular prominence over each eye; a carinated ridge runs the length of the dorsum, elevated into a prominence on the thorax posteriorly; on the anterior part of the abdomen is a flattened prominence, much as in *Limenitis*, but less disc-like, from which the ridge continues down the abdomen, ending two segments from the cremaster. Wing cases very prominent, projecting above the surface of the pupa, with an angular point at base and the outer margin elevated. Colour pale wood-brown,

with many short, darker brown strigæ ; a dark brown tinge along dorsal line, the edges of wing cases and the points over the eyes. Between the thoracic and abdominal prominences, along the thorax laterally and back of the eyes are large yellowish-white metallic patches. Length, 23 mm. ; width through wing-cases, 9 mm.

Food-plants.—Species of oak *(Quercus.)*

ON CATOCALA FLEBILIS AND C. FRATERCULA.

BY A. R. GROTE, A. M.

In describing *C. retecta* and *C. flebilis*, it appears, from Mr. Hulst's statements, that I included certain dark shaded specimens, one or more of *retecta*, under *flebilis*. Mr. Hulst says :—"The typical specimens in Phila. cover both species." This may be true, as also that Mr. Strecker figures a dark shaded *retecta* as *flebilis*. I have not his work. But there is no doubt in my mind as to what was *flebilis*, and there is no excuse for Mr. Hulst's renaming my species as *luctuosa*. Considerable material of *flebilis* from various sources was named by me at the time and notably for Mr. Angus, and there is no doubt as to my original intention. I noticed from the first the brown shade on primaries of *flebilis*, and imagined it might be accidental on my specimens and due to cyanide, as then we were hearing for the first time of the action of that poison on colour.

Without the slightest reason, Mr. Hulst quotes *fratercula* as the species intended by Guenee as *micronympha*. Under *sancta*, Mr. Hulst writes :—"Mr. A. G. Butler writes me this latter is *connubialis*, Guen., but the description does not fit, and it was described from a drawing, and so the name does not in any case hold." Without agreeing, this statement seems to me to apply to the use of *micronympha* for *fratercula*, and, in any event, I hope entomologists will not adopt these changes. Mr. Hulst has adopted, without acknowledgment, most of my corrections of his former work on this genus, as to the value of certain species and varieties, and one or two points of difference may be ultimately decided in his favour. I am, however, of a very strong mind upon two points, namely, that *C. residua* (photographed by me in Bull. Buff. Soc. Nat. Sci.) is a perfectly distinct species, and that the same is true of *Meskei*. Secondly, that my genus *Euparthenos* (Ann. Lyc.) is a valid genus, and the species *E. nubilis* structurally different from *Catocala*. I reserve until another occasion a criticism of Mr. Hulst's paper.

SOME BRITISH COLUMBIA COLEOPTERA.

BY THE REV. J. H. KEEN, MASSETT, QUEEN CHARLOTTE ISLAND, B. C.

Last year (1890) I spent the months of July and August at Inverness —a salmon-canning station at the mouth of the River Skeena, and paid what attention I could spare to the beetles of the locality, a list of which I give below. For the identification of my specimens I am indebted to the courtesy of the British Museum authorities at South Kensington. Some few species, it will be observed, still await complete recognition; meanwhile, the following list may not be without interest:—

Cychrus velutinus, Menetr.
Notiophilus sylvaticus, Esch.
Amara impuncticollis, Say.
Bradycellus cognatus, Lec.
Stenolophus nigrinus, Esch.
Amphizoa (near *insolens*, Lec.)
Rhantus (very near *divisus*, Aube.)
Acilius fraternus, Harris.
Gyrinus Sayi, Aube (?)
Cercyon limbatum, Mann (?)
" *adumbratum*, Mann (?)
Necrophorus maritimus (?)
Silpha lapponica, Hbst.
Anisotoma —— (?)
Creophilus villosus, Grav.
Quedius —— (?)
Baptolinus melanocephalus, Esch.
Stenus —— (?)
Tachinus instabilis, Makl.
Oxytelus fuscipennis, Esch.
Amphichroum testaceum, Esch.
Homalium foraminosum, Makl.
Anthobium pothos, Mann.
Coccinella 9-notata, Hbst.
Dermestes Mannerheimii, Lec.
Platysoma validum, Esch.
Peltis (Ostoma) ferruginea, Linn.
Corymbites umbricola, Esch.
" (near *sagitticollis*, Esch.)
" —— (?)
Melanophila atropurpurea, Say.
Eros simplicipes, Esch.
Telephorus —— (?)
Aphodius —— (?)
Tetropium —— (?)
Syneta carinata, Mann.
Marolia —— (?)
Dircæa —— (?)
Crymodes discicollis, Lec. (?)
Ditylus —— (?)
Cephaloon lepturides, Newm.
Anaspis sericea, Mann.
Dendroides ephemeroides, Mann.
Hylobius pales, Hbst.
Rhyncolus (very near *brunneus*, Mann.)
Tomicus interruptus, Mann.

NOTES.

ASOPIA FARINALIS AS A CLOVER PEST.

In the proceedings of the Entomological Club of the A. A. A. S., at Washington, published in CANADIAN ENTOMOLOGIST, page 220, it is stated that I mentioned a suspicion that *Asopia farinalis* fed in clover, and asked if any one present had any knowledge of the matter. The circumstance shows the desirability of looking such questions up with some care before going on record, as I find that this habit has long since been observed and recorded. In French's Economic Entomology, Part II., Lepidoptera, 7th Rept. State Entomologist of Ill, p. 247, there is a statement that "Dr. Harris says of this that it may be found in old flour barrels; but, according to others, it feeds on corn, straw, and clover." In Tenth Report Ill. State Entomologist, p. 157, we find "Lives in a silken tube in old flour and old clover hay, sometimes burrowing into clover stalks. July to May. (D. W. Coquillet.)"

HERBERT OSBORN.

ULOCHÆTES LEONINUS IN VANCOUVER ISLAND.

I have lately received from Mr. W. H. Danby, of Victoria, B. C., a specimen of the above-named Longicorn, which forms an interesting addition to our Canadian fauna. A drawing and description of the specimen were sent to Mr. E. A. Schwarz, of the Division of Entomology at Washington, who writes of it as follows:—"There is not the least doubt that your beetle from Vancouver Island is *Ulochætes leoninus*, Lec., of the family Cerambycidæ, a very rare insect, and one of the few short-winged species of this family in our fauna. The genus and species are described and figured by Leconte in "Report upon Insects collected on the Survey" (U. S. Pac. R. R. Exp. 47th Parallel), p. 62, pl. II., fig. 12. It is known to pass its stages under pine-bark. Dr. Horn's short note in Proc. Ent. Soc., Phila., VI., p. 293, is all that has been recorded on the habits of *Ulochætes*." It is a large, handsome, yellow and black, hairy beetle, one inch in length, having much the general appearance of a staphylinid with long antennæ. The elytra are very short, the wings not folded at the tips, and the abdomen turned up at the end. J. FLETCHER.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of the Society was held in its rooms in Victoria Hall, London, on Wednesday and Thursday, Nov. 25th and 26th, the President, Rev. C. J. S. Bethune, of Port Hope, occupying the chair. The reports of the Council, Treasurer, Librarian and Curator, the Montreal Branch, the Delegate to the Royal Society of Canada, and those of the Botanical, Geological, Microscopical and Ornithological Sections were read and approved, and were ordered for publication in the Annual Report to the Legislature.

The following gentlemen were elected officers for the ensuing year :—

President—Rev. C. J. S. Bethune, M. A., D. C. L., Port Hope,

Vice-President—W. Hague Harrington, Ottawa.

Secretary—W. E. Saunders, London.

Treasurer—J. M. Denton, London.

Directors—Division 1—James Fletcher, F. R. S. C., Ottawa.

" 2—J. D. Evans, Sudbury.

" 3—Gamble Geddes, Toronto.

" 4—A. H. Kilman, Ridgeway.

" 5—J A. Moffat, London.

Librarian and Curator—J. Alston Moffat, London.

Editor of the CANADIAN ENTOMOLOGIST—Rev. Dr. Bethune.

Editing Committee—H. H. Lyman, Montreal; J. Fletcher, Ottawa; Rev. T. W. Fyles, South Quebec.

Delegate to the Royal Society of Canada—The President.

Auditors—J. H. Bowman and W. E. Saunders, London.

A public meeting was held on Wednesday evening, at which the President delivered his annual address, in which he dealt especially with the chief insect attacks of the year, and the best modes of dealing with them. Papers were read and addresses given by Mr. Lyman on "Can Insects Survive Freezing?" and "Pamphila Manitoba"; by Rev. T. W. Fyles on "The Larch Saw-fly—Nematus Erichsonii", and "The Larva of Gelechia gallæ-diplopappus and its Parasites"; by Mr. Harrington on "Insects Collected and Observed in Japan"; by Mr. Fletcher on "A Visit to Mr. W. H. Edwards"; by Mr. Geddes on "Entomology in Germany"; by Mr. Moffat on "Microscopical Observation of an Unexpanded Wing of Callosamia promethea". Many specimens were exhibited in illustration of the various subjects brought before the meeting, and interesting discussions took place upon them. Full reports, with the papers in detail, will be given in the forthcoming Annual Report. The meeting was highly successful and enjoyable, and was very well attended.

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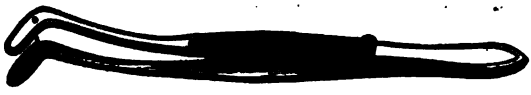

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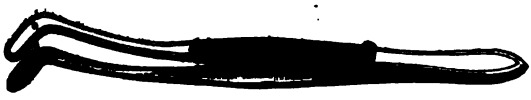

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No. 10.

THE

Canadian Entomologist

VOLUME XXIII

EDITED BY

REV. C. J. S. BETHUNE.

PORT HOPE, ONTARIO.

OCTOBER, - 1891.

LONDON:
LONDON PRINTING AND LITHOGRAPHING CO.
1891.

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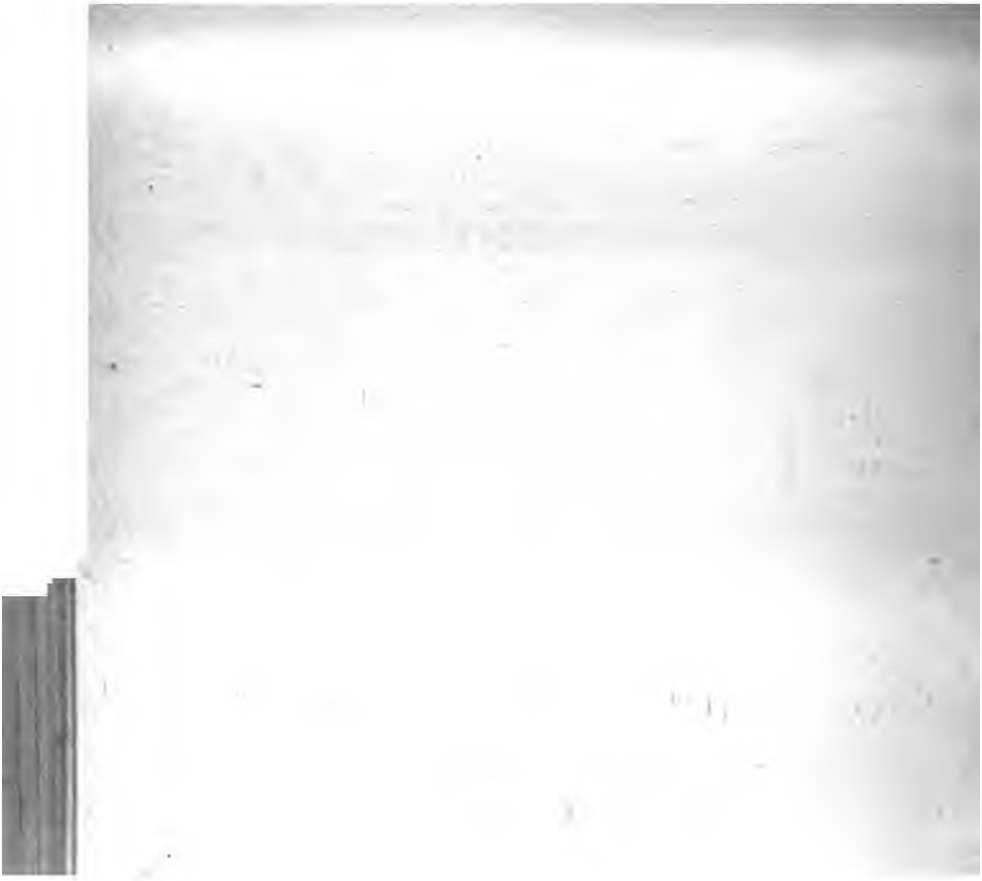

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P. GILLETTE, Fort Collins, Colorado.

EGGS AND LARVÆ OF BOMBYCES WANTED.—Will purchase or exchange for eggs or larvæ of any species of *Gastropacha, Sphingicampa, Coloradia, Enlocophasia, Glaphyria, Heteropacha Rileyana, Saturnia galbina, Seirodonta bilineata, Nevria siccifolia* and *Paravyglia achatina*. Send in tin box. A. S. PACKARD, Providence, R. I.

LEPIDOPTERA OF MONTANA exchanged for other desirable species. CYRUS S. WILEY, Miles City, Mont.

I offer *Paphia troglodita, Apatura celtis, Colias caesonia* and other Mississippi Valley *Diurnals*, as well as *Sphinges* and *Bombycids*, for species of Lepidoptera, which I do not have. Exchange eggs, larvæ, pupæ, or imagoes. R. R. ROWLEY, Curryville, Mo.

DIPTERA.—I wish to exchange for Diptera from all parts of North America. Will collect any order or group of insects in this locality. J. M. ALDRICH, Agricultural College, Brookings, S.D.

LEPIDOPTERA.—I wish to buy or exchange, live cocoons and pupæ of *Platysamia cecropia, P. gloveri, Citheronia regalis*, and other species; also, larvæ of *Apatura celtis*, if not too late. ALFRED WAILLY, Tudor Villa, Northiam, England.

A few live cocoons of the very rare *Samia columbia*, Sm., in exchange for other rare species; eggs or cocoons preferred. Also set specimens of N. A. Lepidoptera. List exchanged. EMILY L. MORTON, Newburgh, N. Y., New Windsor Delivery.

COLEOPTERA.—Exotic and European Coleoptera all named, for *Cic. willistoni, C. limbalis, C. oregona, C. formosa, C. limbata, C. unipunctata, C. fulgida, C. sexguttata, C. punctulata, C. punctulata* var. *fasciata, C. punctulata* var. *vittata, C. punctulata* var. *lecontei, C. punctulata* var. *unicolor, C. punctulata* var. *obsoleta, C. punctulata* var. *pulchra, C. punctulata* var. *formosa, C. punctulata* var. *limbata, C. punctulata* var. *unipunctata, C. punctulata* var. *fulgida, C. punctulata* var. *sexguttata, C. punctulata* var. *punctulata, C. punctulata* var. *punctulata* var. *fasciata, C. punctulata* var. *punctulata* var. *vittata, C. punctulata* var. *punctulata* var. *lecontei, C. punctulata* var. *punctulata* var. *unicolor, C. punctulata* var. *punctulata* var. *obsoleta, C. punctulata* var. *punctulata* var. *pulchra, C. punctulata* var. *punctulata* var. *formosa, C. punctulata* var. *punctulata* var. *limbata, C. punctulata* var. *punctulata* var. *unipunctata, C. 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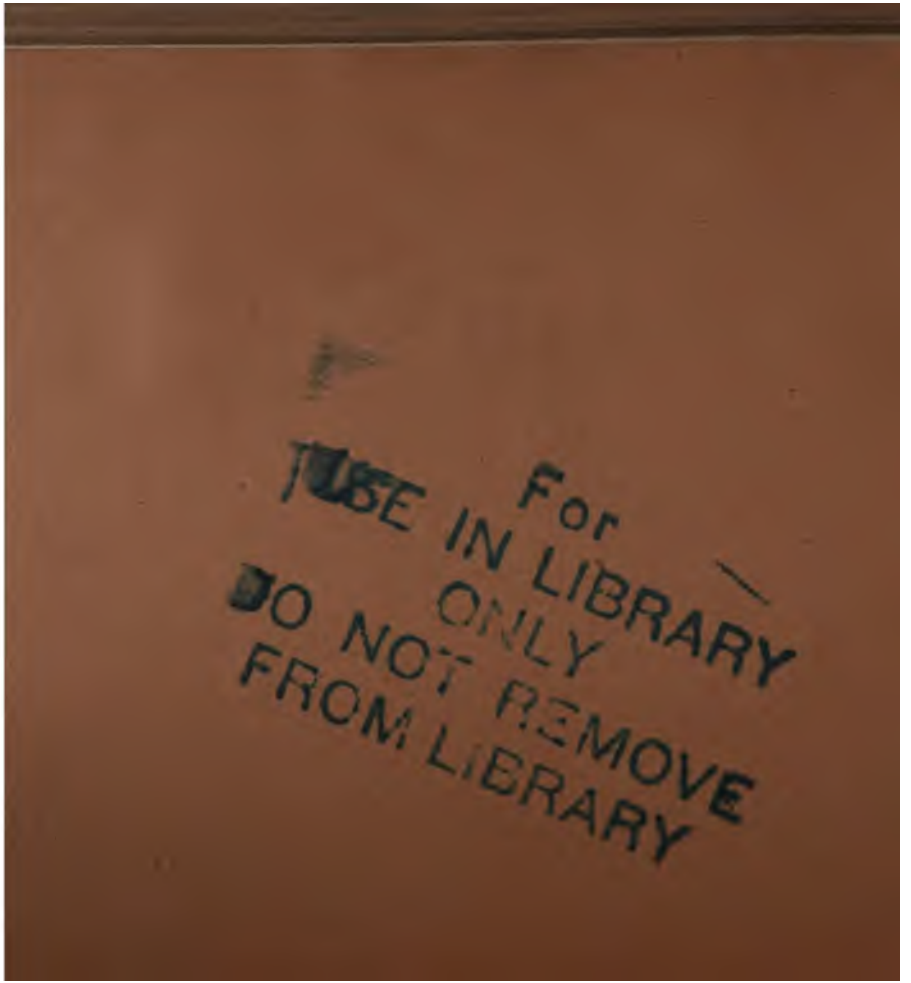
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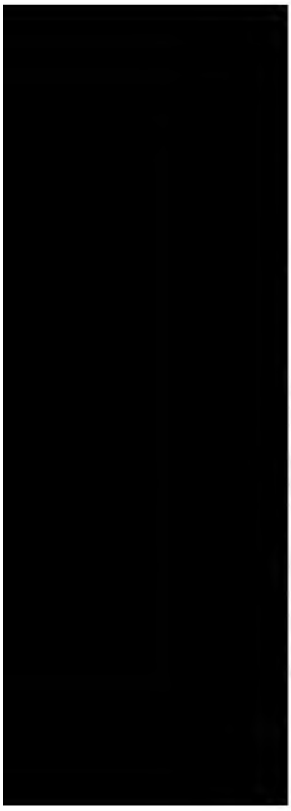

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